OCT. 3 1958

PETROLEUM WEEK

A McGRAW-HILL PUBLICATION

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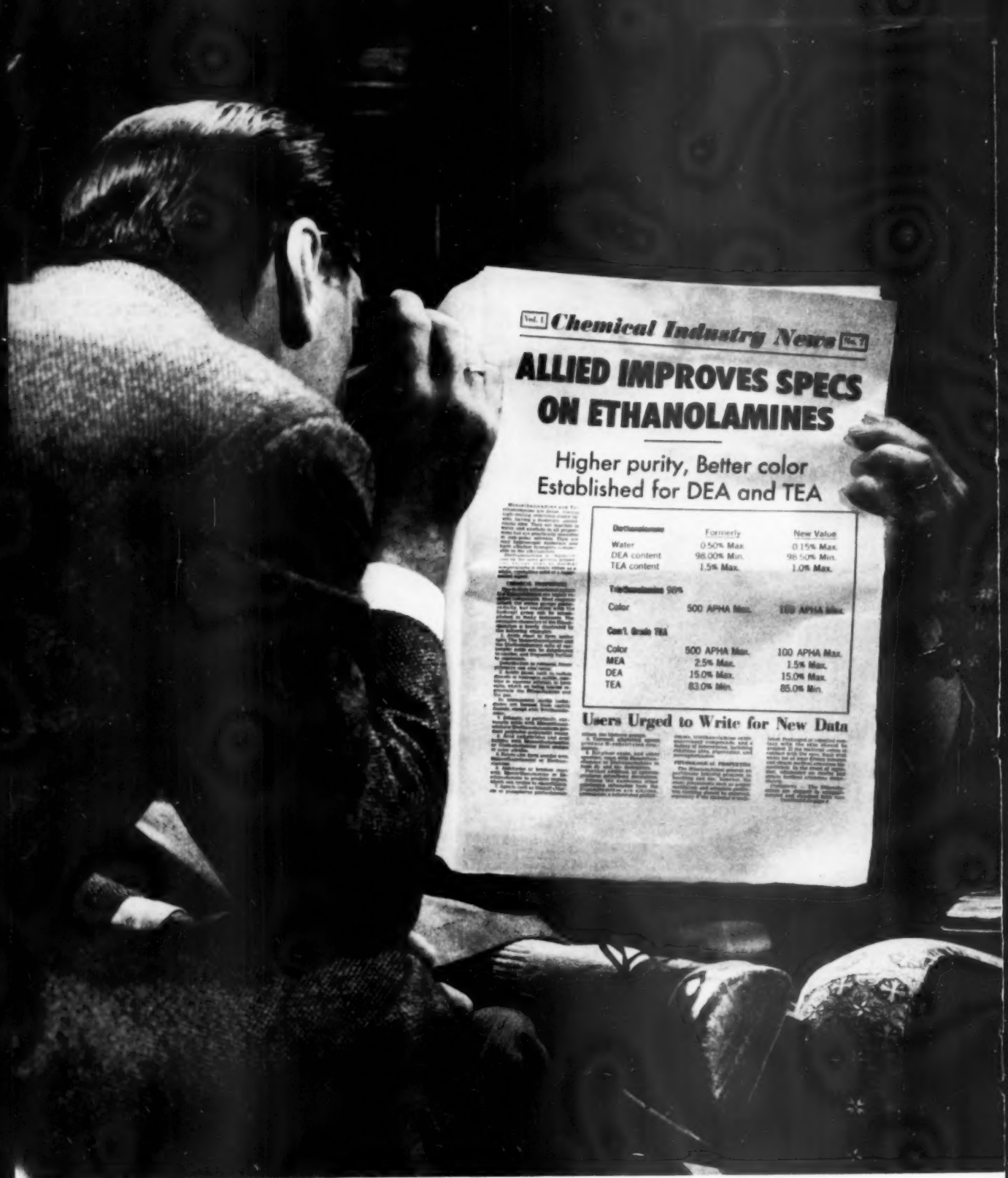

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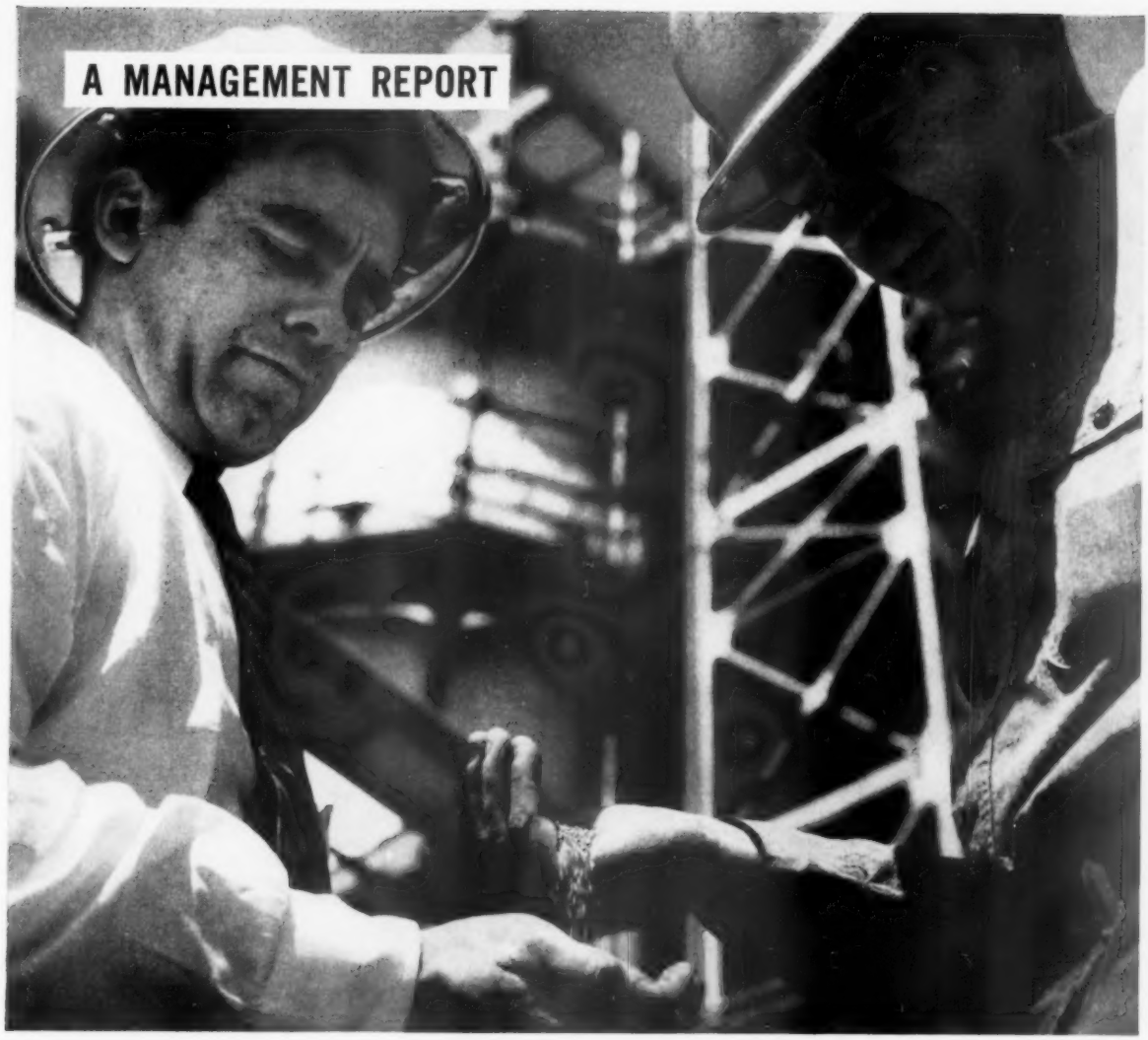

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by T. B. KIMBALL
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A McGRAW-HILL PUBLICATION

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Good Wells Make Good News

A Monthly Report of Successful Well Treatments

October 3, 1958

Acidizing has come a long way since its use was limited to wells producing from simple limestones. Today, Dowell offers acids for many kinds of formations, from fast-reacting vugular or fractured limestones to slow-reacting dolomites and dirty sandstones. In addition, acids are available with addition agents designed to remove or prevent nearly every kind of permeability block. Here are four recent examples of special Dowell acidizing jobs:

- **Beaver County, Oklahoma.** (New Gas Well) This well was completed through perforations into the Chester lime from 6869 to 6927 feet. Two Dowell treatments were used. First, 1000 gallons Mud Acid was pumped down the casing to clean up perforations. In the second treatment, 20,000 gallons low-surface-tension acid was pumped down casing at 40 bpm. Treating pressures during last treatment ranged from 1550 down to 1000 psi. Before treatments well tested 3660 mcfd. After Mud Acid, it tested 20 mmcfd. *Following the final acid treatment, it tested 78 mmcfd.*

- **Alberta, Canada.** (Old Oil Well) This well was originally completed in 1950. The producing formation was the D2, and completion was open hole from 5000 to 5040 feet. Well had produced about 90,000 barrels of oil in eight years; but, at this point, production was nil and fluid level in the well was only 65 feet. The producer then had Dowell acidize using 5000 gallons Retarded Acid. Average injection rate was 5 bpm at pressures ranging from vacuum to 2200 psi. *One month after treatment, production had leveled off at 100 bopd flowing. Gas-oil-ratio was 250.*

- **Big Horn County, Wyoming.** (Old Oil Well) This well had been producing from the Tensleep formation and was re-completed in the Embar lime. Laboratory tests of produced fluid indicated severe emulsion problems. Formation samples contained substantial quantities of sulfates. Dowell suggested an acid with a demulsifying agent plus calcium chloride. The demulsifying agent was proposed to prevent tough emulsions from forming. The calcium chloride was used to keep the acid from dissolving and re-precipitating formation sulfates. Well was treated with 6000 gallons acid with demulsifying agent and 17,500 pounds calcium chloride. *Before treatment, well swabbed 2.5 bopb. After treatment, well tested 22 bopb — flowing.*

- **Logan County, West Virginia.** (Old Gas Well) This well was completed open hole in the Big Lime formation from 2671 to 2713 feet. It had produced little gas even though the offset was good. To clean up and acidize the formation, the operator ordered this three-stage treatment from Dowell: (1) 1000 gallons regular acid with Deterger® added to suspend materials blocking the formation. (2) 4000 gallons Retarded Acid to extend drainage area in the fast-reacting limestone. (3) 3000 gallons regular acid with Deterger. Well had been producing 10,000 cfd. After treatment, it gauged over one million cfd. *Treatment costs were paid out in two weeks and entire well cost was recovered in five months.*

Let your Dowell engineer help you "tailor" an acid treatment for your well. For service or more information, call any of the 165 Dowell service points and offices. In Canada, contact Dowell of Canada, Ltd.; in Venezuela, contact United Oilwell Service. Dowell, Tulsa 1, Oklahoma.

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60-Second Summary / WHAT'S HAPPENING IN OIL

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October 3, 1958

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The oil industry plans to hike capital expenditures in 1959, chiefly in drilling and production. That was indicated in a compilation made this week of spending forecasts supplied by oil firms. . . . p. 13

•

Refiners are proving that their estimates of "desired" crude stocks were high. Generally they report satisfactory—and in some cases more efficient—operations with tight inventories. . . . p. .11

•

The drilling industry is set for deeper horizons now that it has drilled a 25,000-ft. hole. A Special Report explains that such superdeep drilling is the result of proper knowhow, more dependable equipment, and ceaseless research. . . . p. 35

•

Drilling in the U.S. will push to new peaks in the 1960s, with possibly 65,000 annual completions. That's a forecast by Republic Steel, which sees domestic crude output continuing upward until 1980. . . . p. 21

•

Synthesizing gas from oil shale could be more attractive economically than making liquid products, according to the Institute of Gas Technology. Tests with a hydrogasification process show a 90% to 100% conversion of shale to fuel gas. . . . p. 74

•

A New Jersey service station has all the looks of a private-brand outlet, except for an Esso sign and "major" prices. It's Esso Standard's test of private-brand merchandising techniques (12 pumps, no lube bays), including trading stamps. . . . p. 84

•

The sparsely drilled Black Mesa Basin of Arizona could become the next active area in the Four Corners region. Current exploratory interest is focused on a Pennsylvanian trough which separates the Black Mesa from the Paradox Basin. . . . p. 28

•

Cost-conscious gas pipelines are planning more remote-controlled stations. Rising prices for gas and stiffer competition from other fuels are dictating the move. . . . p. 80

•

New-car sales next year are expected to show a marked improvement over 1958. Unit sales won't reach the 7-million peak of 1955, but may run between 5.5-million and 6-million. . . . p. 66

•

Three wildcats are planned for the East African states of Somalia and Somaliland. Ten dry holes so far haven't dampened the hopes of five companies in the area. . . . p. 71

Up to the Minute

SIGNIFICANT LATE NEWS

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October 3, 1958

The nation's economy is apt to become less stable, instead of more stable. That's the view of Dr. Pierre Rinfret, an economist with a major consulting firm. He sees the dominance of slow, long-term trends giving way to frequent up-and-down fluctuations—some of them violent.

Cross-communication within a company and within industry would become even more vital. Management would need to keep more abreast of day-to-day trends in order to make frequent adjustments to take advantage of—or to avoid the impact of—sudden economic shifts.

•

OCAW now has an "alternate" bargaining target: a 25¢-an-hour wage hike. Earlier, the union had sought multi-year contracts calling for automatic 3.5% annual increases, plus cost-of-living hikes and fringe benefits. It says this is still a goal, but that it will settle for a flat 25¢.

Some independent union may steal the play from OCAW in setting a wage pattern. Several feel that, since OCAW hasn't made any progress, it's time for someone else to make a move. One union to watch: the Independent Oil Workers Union, at Socony Mobil's Paulsboro (N. J.) refinery (page 16). That union is seeking to force a showdown on its request for a 7.5% hike.

•

Small refiners are pushing their campaign for a larger share of imports quotas. The Small Business Administration may back them, giving the drive greater weight. In addition to a setaside, small refiners want the new program put into effect before Jan. 1—the present target date.

•

The Puerto Rico government has promised to quit promoting the building of refineries there, a Puerto Rican government bank official reports. He says the promise was made to Matthew V. Carson during the imports administrator's visit there. The reason: To allay fears that Puerto Rico will push for refineries that could ship untaxed products into the U. S., thereby tending to circumvent the imports control program.

•

The oil industry can anticipate an increasingly tough legislative fight on the 27.5% depletion provision, warns R. V. Miller, general tax manager for Shell Oil Co. He told an industry meeting in New Orleans last week that the industry's best defense is to show just how the loss of the depletion provision would affect the average man's pocketbook.

•

Southern Louisiana got a strong plug this week as a coming leader in natural gas supply and price. A report by a firm of economic consultants, Boni, Watkins, Jason & Co., notes that gas pipeline firms are attracted by "the presence of reliable, long-term supplies," and that gas prices in Louisiana are generally leading the way for other areas.

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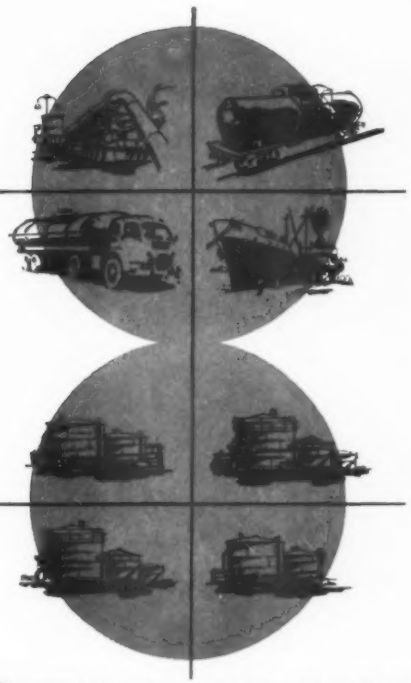

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Fuel oil at *left* is fresh from refinery, bright and clear. *Center*, Nalco-treated oil is bright and sludge-free after four months. *Right*, untreated sample in four months time has darkened considerably, already begun to sludge.

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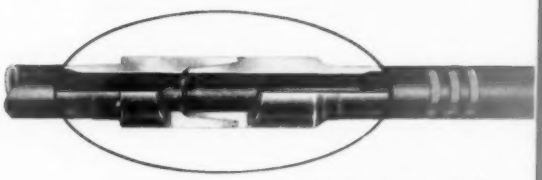
Tension Data (Minimum Values)						
Load at Minimum Yield	Lbs.	135,900	194,270	230,760	270,030	328,070
Equivalent Length	Ft.	19,840	20,450	19,480	19,640	21,870
Collapse Data (Minimum Values)						
Collapse Pressure	PSI	8,380	8,080	7,080	6,290	6,140
Setting Depth (S.F. = 1⅛)	Ft.	14,900	14,370	12,590	11,180	10,920
Internal Pressure at Minimum Yield	PSI	9,980	9,600	8,660	7,900	7,830

*Tension API Weights

YOUNGSTOWN LIGHTWEIGHT DRILL PIPE



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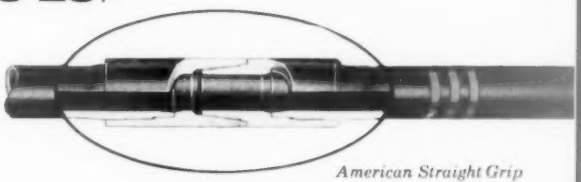

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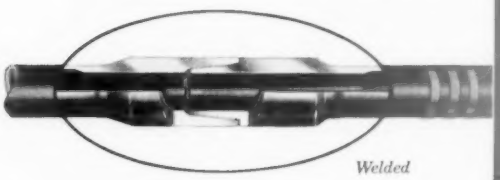
Now, Youngstown provides a lightweight drill pipe that will substantially extend your bidding range. You can bid and *get* those deeper drilling contracts—without any changes in your present rig.



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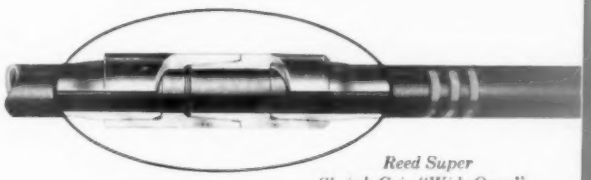

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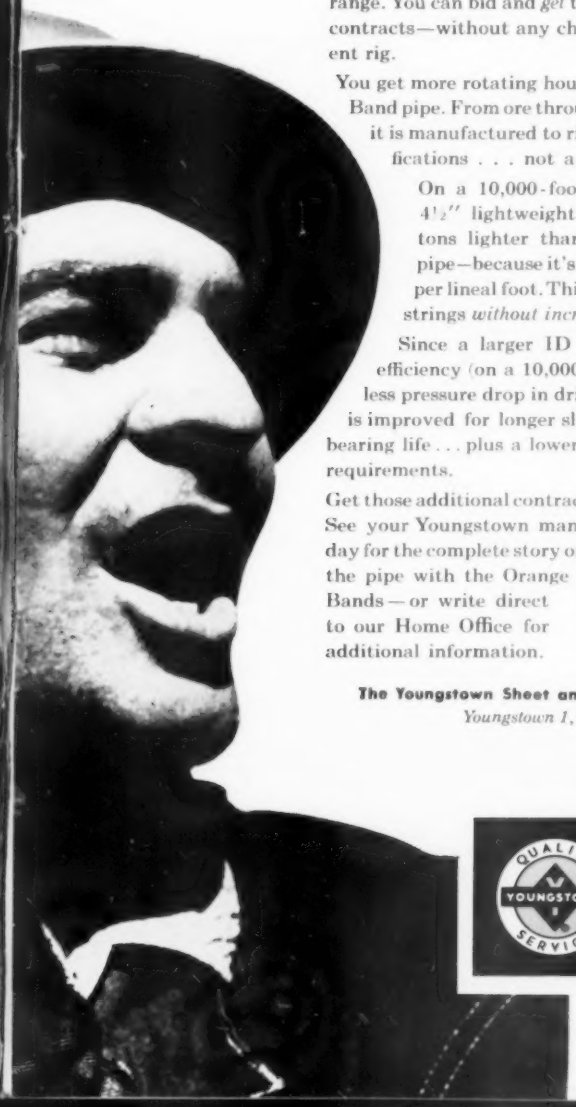

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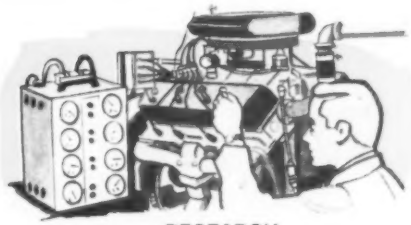

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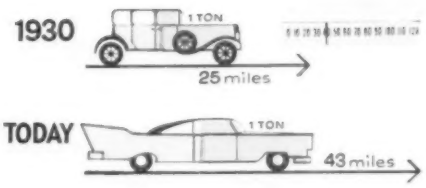

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'Low' Crude Stocks Seem Adequate

Run flexibility has been reduced. But most refiners say 'desired' inventory estimates were too high.

The industry is finding it can operate satisfactorily with much smaller crude inventories than it thought possible.

That much has been proved during recent months as crude stocks steadily declined to a seven-year low. During the same period, refinery runs moved steadily upward to a 1958 peak of 7,982,000 b/d in the first week of September.

Runs have tapered downward considerably since—but still are at a high enough level, in view of over-all product inventories, to meet demand, according to industry observers.

Nationwide, current crude stocks are about 8% below "desired" working levels. East of the Rockies, inventories are 13% under these so-called adequate working levels.

That's based on the testimony presented by 23 large and medium-sized companies to the Texas Railroad Commission last March (PW—Mar.28'58, p11).

The average of their estimates of adequate working crude stocks showed the desired position would be inventories of 257-million bbl. on Apr. 1 and 261-million bbl. on Nov. 1.

That's equal to an over-all average of approximately 260-million bbl., of which most companies say that 230-million bbl. should be in areas east of California.

Using the estimates of the major companies only—leaving out the several smaller companies whose operations are confined to Texas—the average of the estimates of adequate working levels submitted to the Railroad Commission would be much higher.

One major company, for example, estimates that if all refiners had proper working stocks of the various types of crude they generally run, then U.S. stocks of crude would have to be around 275-million bbl.

U.S. crude stocks have been below the 260-million-bbl. "desired" level since mid-June. They started to decline after the end of February, when they reached a 1958 peak of 285-million bbl. (chart).

By mid-September they were down to 240.7-million bbl., 40-million bbl. of which were on the West Coast.

Last week, though, with refinery runs down to 7.6-million b/d. (378,000 b/d under the year's peak set earlier in September), crude inventories moved up to 242.3-million bbl.

Generally, refiners say that the low inventory levels have not handicapped their operations. Some even say they have benefitted by tighter inventory positions.

Figures on operations seem to bear out those statements. Runs reached a peak for the year at a time when stocks of crude were the lowest for the year.

One large company's crude buyer says that its total crude stocks at all its refineries now are 500,000 bbl. under what he would have considered "absolute rock-bottom minimum" a few months ago.

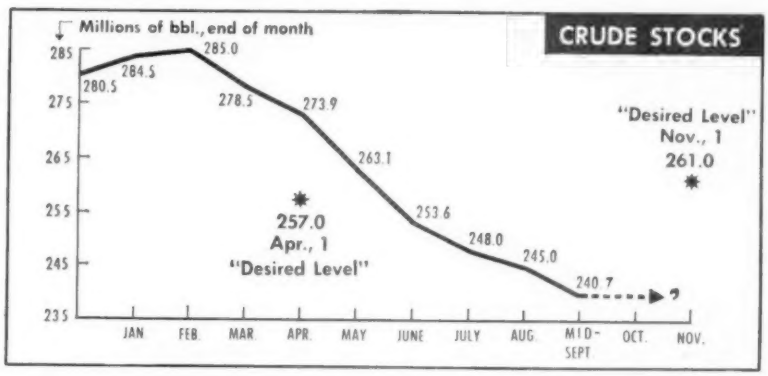
And at the present low level, the company's refinery operations are just as efficient as they were when stocks were larger, he comments.

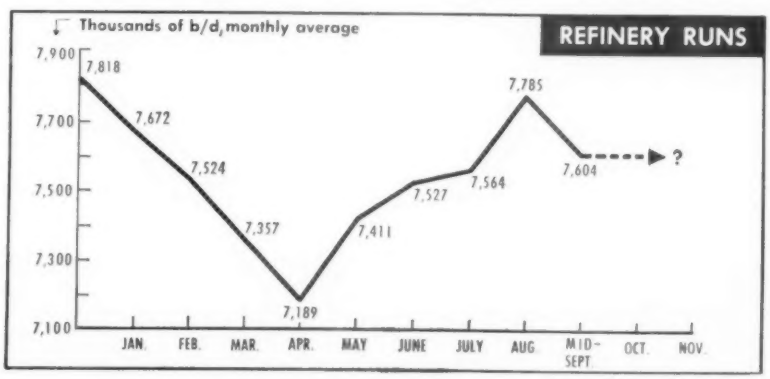
Another crude buyer notes that, while a tighter inventory has tended to reduce the flexibility of using many types of crude in his company's refineries, generally the company has not been short, and operating rates have not been affected by crude inventories.

"It has been the high level of gasoline stocks that has had the most influence on our runs in recent weeks," he says.

But a few refiners say the tight stock position prevents optimizing their crude charge to stills.

Refineries generally can operate on several different types of crude. Each change of crude charge requires adjustments of units to handle the new stream most efficiently. For that reason, refiners prefer to operate as long





as possible on a single type of crude before having to switch to a new charge.

With tight inventories, shortages of a particular type of crude crop up more frequently, necessitating more adjustments to crude units.

For those refiners operating on blended streams, the tight inventories require changes in the blended charge away from the most suitable stream. This can cut into refinery profit margins.

There are shortages of certain types of crude. The low allowables in Texas have greatly restricted output of low-cold-test oil. Some refiners say they are low on mixed sour crudes.

But, on the other hand, those using Four Corners crude at Gulf Coast and Midwestern plants report a long supply of Aneth crude.

Some crude purchasers note that, had the crisis in Lebanon been of more major significance, real shortages might have appeared. Military inquiries for large quantities of jet fuels caused a scramble for crude during late July and early August.

Runs were stepped up to take care of the government orders for immediate delivery. But as the crisis subsided in late August, part of the inquiries for future delivery were canceled, and the pinch on crude was eased.

More-than-ample inventories of most refined products—particularly gasoline—have helped to keep refinery demand for crude down during most of 1958.

Refinery runs for the year to date, averaging 7,526,000 b/d, have been 6% under 1957. Even since the end of June, when runs moved up some, they still have been 4% under a year ago.

Distillate fuel stocks are relatively tight, causing some refiners to worry over the possibility of not having enough stocks of the preferred types of crude from which to maximize distillate yields during the fall and winter.

There is little doubt that industry estimates of "desired" stock levels given the Texas Railroad Commission are not realistic.

The estimates of the preferred product inventory levels are just as far from reality as those for crude stocks.

Gasoline stocks, which industry officials said should approximate 185-million bbl. on Apr. 1, were 30-million bbl. higher. And the desired Nov. 1 gasoline position of 152-million bbl. will be substantially exceeded.

Residual inventories follow the same general pattern as gasoline—much above the desired levels.

Just the opposite is true with distillates—inventories are running under the desired level.

The lack of realism in the estimates of desired stock levels stems from errors both in calculation and in company policies.

For one thing no two companies estimate on the same basis. And it is next to impossible for any one company—no matter how large—to assay accurately what would constitute suitable inventories on a nationwide basis.

Also, there are a lot of small companies included in the Railroad Commission's survey that are not equipped to estimate on an industrywide basis.

And, finally, the policies of some companies sometimes conflict with the true desired stock positions. There is a feeling in some companies that it is better statesmanship to estimate on the high side than on the low side.

The estimates possibly could become more realistic ones if the larger companies were asked to estimate their own inventory requirements, and not industrywide needs.

Such individual stock estimates could be furnished the Railroad Commission, which, in turn, could total them up to arrive at inventory positions that would more accurately reflect actual desired levels.

The total arrived at by the commission would represent a substantial percentage of the industry and, if projected, could become a true yardstick for state regulatory agencies and others in determining the necessary rates of new supply to meet demand.

IPAA Supports New Imports Plan

The Independent Petroleum Assn. of America favors the proposed plan to gear imports restrictions to refinery runs.

The organization's import policy committee expressed that view after a committee meeting last weekend in Tulsa.

It urged the association to cooperate fully with the program administrator "to make the program work."

Gordon Simpson, IPAA's president, cited these reasons for the committee's approval of the plan:

- It should simplify administration of imports controls.
- It recognizes the necessity for limiting imports on a long-range basis.

However, the association does feel that some features of the tentative plan should be revised.

The import policy committee said it would present detailed information on the desirability of including District V in the program, as well as including imports of crude derivatives and asphaltic crudes.

Also, the committee said, depressed levels of exploration, drilling, development, and production "suggest the necessity of reducing the level of imports."

In Washington, there were indications that government oil officials expect to make some adjustments in the plan after they finish receiving industry recommendations (page 18).

There has been no hint, however, of any specific contemplated change.

Matthew V. Carson, imports administrator, has noted that some observers fear an upswing in refinery runs during the base period by refiners hoping thereby to get a higher imports quota. But he says he doubts there would be any large increases for this purpose. For one thing, he says, "the market has to be there."

Meanwhile, the government reported that crude imports in August exceeded allocations under the current program.

Carson said that crude imports for Districts I-V reached 977,400 b/d, 43,400 b/d over the total allocation.

He blamed Eastern States Petroleum & Chemical Corp. and Delta Refining Co. for the overage.

PLAN '59

PLAN '59 is the symbol of the most comprehensive editorial job yet undertaken by PETROLEUM WEEK.

The subject: Modernization in the oil business.

The goal: To show how oil men can use modernization as the most effective profit tool in preparing now for the coming business upsurge.

The scope: Thirty-five pages of data on modernization in all segments of the industry—plus a review of some bets oil men may be overlooking.

The date: PETROLEUM WEEK's issue of Nov. 7.

Oil Hikes '59 Capital Spending Plans

Although 1958 capital expenditures by the oil industry may fall below earlier forecasts, a definite upswing is likely in 1959.

That was indicated in a recent survey of the industry by Lionel D. Edie & Co., New York economic consulting firm.

The findings of the survey were revealed at this week's meeting of the American Assn. of Oilwell Drilling Contractors, in Dallas. The presentation was made by Dr. Pierre Rinfret, of the Edie firm. He stressed the point that his was not a forecast by his company but a compilation of the returns of a survey of a substantial cross-section of the industry.

He gave these figures for 1958, based on the current survey: Production, $3,470,000,000; transportation, $345-million; processing, $700-million; marketing, $360-million; and other, $60-million.

The total for 1958: $4,935,000,000.

By comparison, a McGraw-Hill survey last spring (PW—Apr.18'58,p11) listed these prospective totals:

Drilling and production, $3,783,000,000; transportation, $338-million; processing, $768-million; marketing, $413-million, and other, $69-million. The total: $5,371,000,000.

For 1959, capital expenditures for the oil industry as a whole will reach $5,177,000,000—exceeding the 1958 spending by a margin of from 5% to 9%, Rinfret said.

(The 5% margin is by comparison with the 1958 figure shown in Edie's September survey.

The 9% increase is by comparison with a 1958 capital expenditures figure for oil reached by the U.S. Department of Commerce, which uses a slightly different basis in classifying capital expenditures.)

The 1959 capital spending for drilling and production will be 11% above 1958, according to figures given in the September survey.

The total for this segment of the industry in 1959 will be $3,846,000,000, compared to the revised 1958 total of $3,470,000,000.

However, a drop is now expected in transportation (28%), processing (2%), and marketing (9%).

Aside from drilling and production, the only other expected oil industry increase is in the "all other" category, which is expected to rise 17% to a total of $70-million.

The question of whether domestic drilling contractors should go abroad or not also drew attention this week.

The subject was frequently broached at the Dallas meeting of the contractors.

It isn't a new problem, of course, because many contractors are already operating overseas and others have definite plans to do so.

But the current economic situation facing domestic contractors is causing others to ponder the step.

Some contractors say they are being urged by bankers and by operators to look abroad because of increasing opportunities there.

For instance, one contractor said: "I've been told that things are going to stay at a pretty low level here, while they'll be picking up steadily overseas for years to come."

And there apparently is an increasing trend by major international oil firms to turn more and more to drilling contractors.

This was pointed out earlier this year by Wallace W. March, a co-owner of International Drilling Co. (PW—Jul.25'58,p44).

March said that the major companies operating abroad are aware that a contractor faces high operating costs abroad—about 25% above the U. S.—and are willing to pay these higher costs.

According to March, one reason for the swing to drilling contractors abroad is the need for drilling deeper wells. Major companies are faced with a choice, he said, between buying deeper drilling equipment or contracting it.

On the other hand, some drilling contractors are still skeptical about getting into overseas operations.

A contractor at the Dallas meeting had this observation:

"I've been told about the opportunities overseas, but I don't put much faith in it. We were being told the same thing about offshore opportunities several years ago. And look at the offshore picture now."

Some wonder how long it will be before U. S. companies "lose out" overseas.

"I have had a lot of doubts about the future for an American contractor anywhere abroad—including South America," a contractor commented.

He obviously was referring to political and economic situations abroad, which may change abruptly, and which could result in a rolling up of the welcome mat in some areas.

Some contractors also doubt that the opportunities abroad are as good as they are sometimes painted.

They point out that some of the

Russell Brown, 'Mr. IPAA' To Retire

Russell B. Brown, one of the staunchest supporters of the independent oil and gas producer, will retire at the end of 1959.

At that time Brown will have completed 30 years of service with the Independent Petroleum Assn. of America, which he joined on a "temporary basis" when it was formed in late 1929.

Brown, who was practicing law in Ardmore, Okla., at the time, became executive manager at the request of Wirt Franklin, the first president of IPAA. Brown later became general counsel and has served continuously in that position in IPAA's Washington office, except for a brief period of government service during the National Recovery Administration days in the early 30s.

Brown organized the campaign that succeeded in getting the first tax on petroleum imports in the early 30s.

And he has continued since to fight for the protection of domestic producers from a "flood of cheap foreign oil."

This week Gordon Simpson, IPAA president, commented: "For almost a third of a century, Russell Brown has demonstrated a gifted perception of the problems of the industry to which he has dedicated his life. . . . He has been champion to hundreds of its leaders. . . . He has come to be known as 'Mr. IPAA.'"

No successor to Brown has yet been named. L. Dan Jones has served in Washington for several years as assistant general counsel.

Early this year, Minor S. Jameson, Jr., who had been assistant to the president in Washington, was elected executive vice-president.

largest firms operating in South America have only 50% of their rigs there in operation.

And they note that there is a minimum of rigs operating in the Middle East.

Thus, they conclude, it wouldn't take much to make the overseas picture as crowded as the one at home.

Recent indications that the domestic situation is improving may tend to decrease the lure of going abroad.

With demand strengthening, and with the government clearly planning to keep a lid on crude imports, domestic firms have hopes that their business will pick up.

Such optimism, however, is usually tinged with caution.

J. U. Teague, the outgoing AAODC president, said contractors face a long spell of having to live with a reduced level of domestic activity—at least by comparison with 1955 and 1956.

Intrastate Gas Has Limits

Gas producers were warned last week against banking too heavily on intrastate gas markets.

The warning was made by C. P. Rather, president of the Southern Natural Gas Co., at the New Orleans meeting of the Louisiana-Arkansas division of the Mid-Continent Oil & Gas Assn.

Talking principally of Louisiana, Rather predicted that, despite industrialization of the state, interstate gas sales will always be the key factor in keeping natural gas in strong demand.

He noted that interstate markets took about 62% of Louisiana's gas production last year. And he credited the growth of interstate markets with helping boom gas demand in recent years. Louisiana's production in 1957 was almost ten times the amount produced in 1931, he said.

Rather's remarks apparently were aimed at growing efforts by producers in gas states to develop intrastate markets and thus avoid federal regulation as ordered by the Phillips case decision.

Rather made it clear he feels there are definite limits to such a trend and that loss of interstate markets would be a blow to gas producers.

There was a warning, too, that increasing state taxes could be a factor in causing gas to price itself out of some markets.

Rather was referring specifically to the recent 1¢ boost in Louisiana's gas gathering tax.

The tax question was also discussed at other sessions of the association's convention.

Louisiana officials announced that they plan to meet with Federal Power Commission representatives soon to "smooth out" a federal angle in the tax situation.

This problem stems from an FPC ruling that the state tax increase could be the basis for a rate increase—but with the proviso that the money be refunded if the tax is eventually declared unconstitutional.

BOUWE DYKSTRA is the new president of the Louisiana-Arkansas division of the Mid-Continent Oil & Gas Assn.

The trouble with that, as the state sees it, is that the tax paid to the state is unrecoverable if it is not paid under protest. Therefore, a producer could pay the tax once to the state and then, if the tax is ruled out, be forced to refund the tax, without being able to recover it from the state. Thus, in effect, the producer would be paying the tax twice.

On tax matters in general, a tax expert urged that oil firms keep a close watch on the effects of all taxes.

Ream V. Miller, general tax manager of Shell Oil Co., said that the oil man who does not consider the impact of taxes is like a man driving blindfolded.

He said that the tax specialist who keeps management informed on tax problems is "pretty generally conceded to be as essential as the lawyer, the engineer, the salesman, and the accountant."

Atomic Tankers May Get Boost

The government plans to ask Congress for authority to share nuclear-powered tanker construction with industry.

If the legislators O.K. this move, as the Maritime Administration expects, then Maritime will also ask Congress for money with which to get actual construction under way.

In one phase of the program—surface tankers—the government would help foot the bill for the cost of installing nuclear units.

This cost, in vessels of 35,000 to 45,000 deadweight tons, would be about $5-million more than for a conventional tanker of that size.

The present Maritime plan is to ask Congress for permission to share this added cost on a 50-50 basis with industry.

In addition, companies building these tankers may also seek a government subsidy to help further in defraying the cost of construction. Tanker operators are eligible for such subsidies now, but have shied away from them.

Maritime officials say that right now at least three oil companies are ready to move into construction of surface nuclear tankers.

In the other phase of the program—submarine tankers—the Administration may ask Congress for some $50-million to build an experimental ship.

A decision on whether to push this phase of the program will not be made, however, until next year, when studies will be completed on the feasibility of such vessels.

What the government has in mind now is a 20,000-ton submarine tanker, although the study being made also covers sizes up to 40,000 tons and speeds ranging from 20 knots to 40 knots.

But it is thought that Maritime would settle for a 20,000-ton vessel as a starter, figuring it would provide operational experience needed before a larger size is attempted.

Those who are pushing for a submarine tanker feel that such a ship would have some big advantages over surface tankers.

These advantages, they say, include: the ability to travel far below the surface, thus avoiding storms; higher speeds; and a likely reduction in ship manpower.

They feel these advantages will outweigh the higher costs.

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What's New / IN THE INDUSTRY

For the far distant future, hydrogen fusion power from sea water is foreseen as an energy source. That is the prediction of Frederick Kramer, an engineer for Public Service Electric & Gas Co. (New Jersey).

He told a national power conference in Boston this week that the first steps in hydrogen fusion are taking place with nuclear fission. The latter energy source is "stopping the gap" until the advent of hydrogen fusion "before the end of the century," he said.

•

A 3,700-acre Lake Maracaibo farmout from Creole Petroleum has been taken by Superior Oil Co., which has already pushed production up to 44,000 b/d on its own midlake Group 75 lease. Superior will probe for the lake's first cretaceous production in a test now being drilled on Creole's Group 15 lease, about 6 mi. off the northwest lakeshore. It is scheduled for 17,000 ft.

•

Domestic demand next year will jump 6% over 1958, John G. Winger, petroleum economist of the Chase Manhattan Bank, predicts. He told the annual meeting of the Louisiana-Arkansas division of the Mid-Continent Oil & Gas Assn. that domestic demand would average 9,660,000 b/d. Assuming no further decline in exports, he forecast total demand at 9,925,000 b/d, also a 6% gain.

During the next ten years, domestic demand will show an average increase of 5%, Winger said.

•

Socony Mobil's Paulsboro (N.J.) refinery may be closed by a strike. The Independent Oil Workers Union of Paulsboro last week voted to walk out Oct. 4 unless an agreement were reached on its 7.5% wage hike demand. A union official said "the company hasn't even made a counteroffer."

•

Brazil has taken another step toward accepting a Russian barter offer for 200,000 tons of crude. The proposed $5-million deal, already approved by the Foreign Office, is now under study by the Bank of Brazil, after the state oil agency announced that no refinery changes would be required to handle the crude.

•

Oklahoma and Kansas trimmed their October crude allowables. The Oklahoma Corporation Commission ordered a 10% reduction across the board from the 560,000 b/d allocation for September. Conservation Director Messena Murray had recommended holding October production at the September level.

In Kansas, the Corporation Commission set the October allowable at 330,000 b/d, a reduction of 3,000 b/d from last month. Jewel Ogden, the conservation director, had requested that no reduction be made.

•

Kerr-McGee Oil Industries, Inc., is showing further interest in prospecting for saline ore. The company, which leased 14,886 acres in California's Mojave Desert from Southern Pacific Land Co. late last year, has acquired mining rights on an additional 2,000 acres there. The company, which has branched out to become one of the largest producers and processors of uranium, is prospecting for salines and other evaporites, including compounds of sodium, potassium, and boron.

INSIDE *Slant*

A SILVER LINING

One bright spot is beginning to appear on the horizon for the drilling industry.

This is that the number of efficient rigs is being reduced constantly, due to deterioration and stripping of capital items from idle rigs.

A reduction in the number of efficient rigs as a means to a better future for the drilling contractor may sound a bit off base.

But not when you consider that a surplus of efficient rigs—the same as too many apples or oranges—means uneconomic competition for the available market and, consequently, unrealistically low bids.

Once this surplus has been reduced to a level more in line with today's reduced activity, then there will be greater appreciation from the producing segment of the industry of the better tools for doing its drilling.

Where formerly the producer requested bids from only a few contractors, he now seeks bids from 25 or more. The end result is that the keen competition for the job results in prices that actually are below proper economic levels.

And "clouded" profits do not take into consideration depreciation or overhead.

LeRoy Menzing
EDITOR

AN ANNOUNCEMENT OF INTEREST TO THE PETROLEUM INDUSTRY

Patent No. 2,833,638 has been issued to Servco for SERVCOLOY cutting and hard-facing material

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The secret to these phenomenal results is a unique method of suspending hundreds of small chunks of carbide in a tough, elastic matrix. As chunks are worn or torn away, new chunks with fresh cutting edges are automatically exposed.

Servcoloy's widespread success has spawned numerous imitations. Unfortunately, results in some instances, because of the use of inferior materials and lack of knowledge of proper manufacturing techniques, have been disappointing, reflecting adversely upon the Servcoloy process. Issuance of the patent disproves the statement frequently heard, "all carbide hard-facing materials are the same." Techniques of manufacture, method of application, and use of Servcoloy result in a superior product with a proven record of superior performance.

We assume you will desire to use the patented invention. Therefore your patience pending selection of additional sources of supply will be appreciated.

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Looking Ahead in Washington

McGraw-Hill
Washington
Bureau
October 3, 1958

The Federal Power Commission is speeding up its consideration of the Midwest gas case. FPC has set oral arguments for next Thursday (Oct. 9), thus taking the huge case out of the hands of Examiner Francis L. Hall and placing the issues directly before the commission. The hurry-up procedure came as a result of requests by Tennessee Gas Transmission Co. and its subsidiary, Midwestern Gas Transmission, which wants to build a Tennessee-to-Canada gas pipeline.

A decision on the case now may be reached by Nov. 1. That's the date Tennessee and Midwestern asked. Trans-Canada Pipe Lines, Ltd., proposed supplier for the gas project, plans a rate increase then. Midwestern claims that an affirmative FPC decision would avoid the higher costs. But any decision by FPC—whether for or against the Midwestern plan—is sure to wind up in the courts, on appeal from competitors. Meanwhile, the Justice Dept. has pending an antitrust suit against three companies that oppose the Midwestern application.

•

A congressional probe of FPC's gas pipeline activities has been delayed until after the November elections. Rep. Oren Harris (D., Ark.), chairman of the House Subcommittee on Legislative Oversight, started FPC hearings last week. The subcommittee heard FPC officials on hydroelectric matters. Harris wants to go into the commission's natural gas practices later.

•

The Interior Dept. expects a large flow of suggestions on oil imports planning within the next week. So far, a limited number of companies and groups have commented on the proposed refinery-run imports plan. The bulk of replies probably will come in the last week before the Oct. 13 deadline. Government officials now are conceding that several changes may have to be made in the proposed plan before it is put into operation. The government is expected to remain firm, however, on some major points—including restriction of imports to 10.1% of total demand.

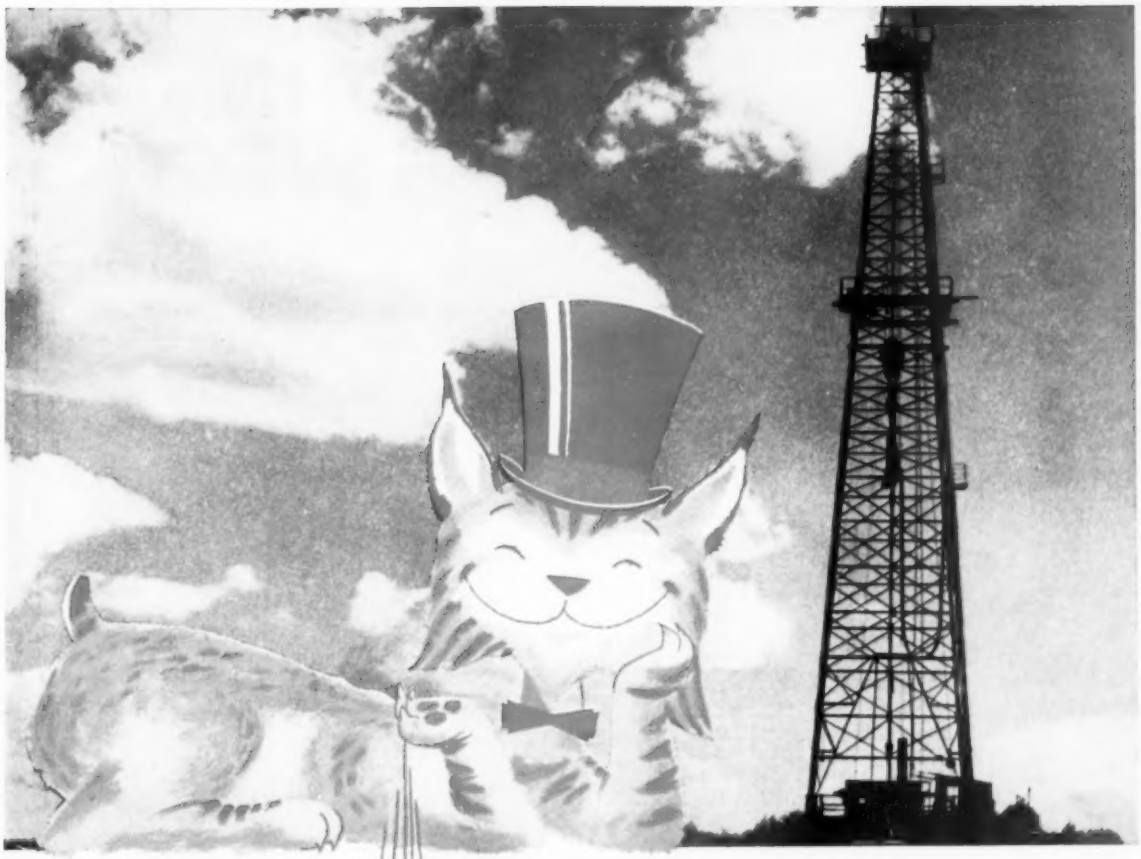
There is some talk that the government is prepared to impose mandatory controls if importers who have not been complying with quotas do not begin complying soon. Otherwise, the government fears, a few noncompliers will wreck the progress.

•

Administration hopes are rising for a major, nongovernment helium program. The Interior Dept. has extended feelers to private industry and has received an unexpected surge of positive interest. The idea is to spur private construction of about 12 helium plants, costing an estimated $225-million, with some government financial help. The Administration's plan will be pushed in Congress next year, and the initial interest of some 30 companies—including gas pipeline firms—is expected to boost the program's chances.

•

The White House staff shake-up may have some effect on the handling of petroleum policies. Some quarters of the oil industry have frequently blamed Sherman Adams for the lack of strong White House support on natural gas legislation, for example. With Adams leaving, no one man is expected to carry such weight in making recommendations to Eisenhower.



"Wildcats" *are thriving in Canada!*

Canadian drilling activity in 1957 was highlighted by five rich wildcat oil strikes in the Virginia Hills section of Alberta and continued success in Pembina. Drilling was also very active in southeastern Saskatchewan which is currently regarded as the "hottest" oil area in Western Canada.

One of the brightest aspects of Canadian oil opportunity to U. S. oilmen is the remarkable success ratio of wildcats to wells brought in—one producing well for each three to four wildcats.

U. S. Oilmen Like To Do Business With the B of M

Over 250 offices of the Bank of Montreal give U. S. and Canadian oilmen day-to-day service in the oil-rich provinces where most of Canada's new drilling activity is now concentrated. The Bank will gladly give you detailed information on any phase of Canadian oil.

"A Guide for Oil and Gas Operators," 40-page brochure published by the B of M, is a basic reference for facts on the ownership and disposition of petroleum rights in the oil provinces. A copy is yours for the asking. Contact John A. Baines, Manager, Oil & Gas Dept., Bank of Montreal, 140 Eighth Avenue West, Calgary, Alberta, Canada. (Telephone AMherst 6-8701).

No Stock Recommendations

While the Bank is prepared to provide all available information on the oil industry, it does not make recommendations regarding the purchase of individual oil stocks.

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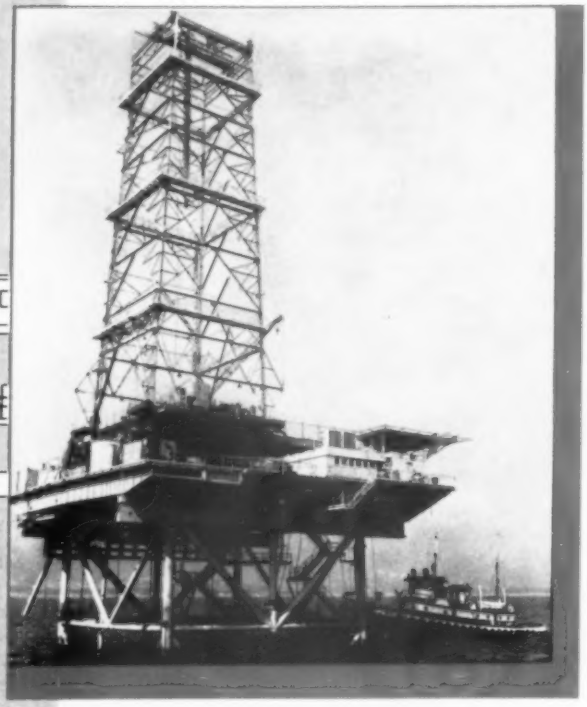

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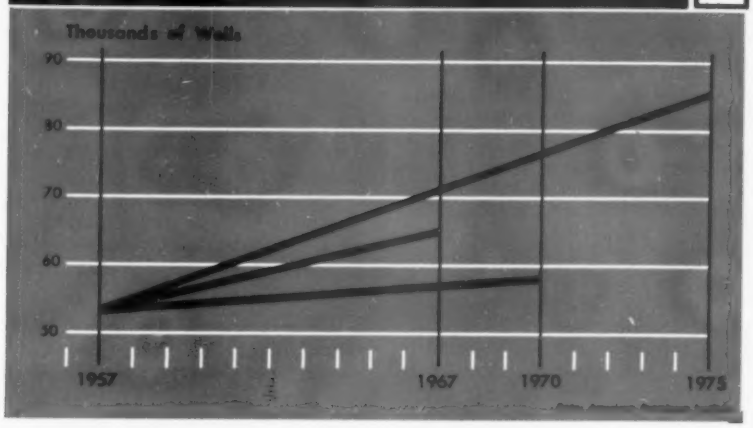
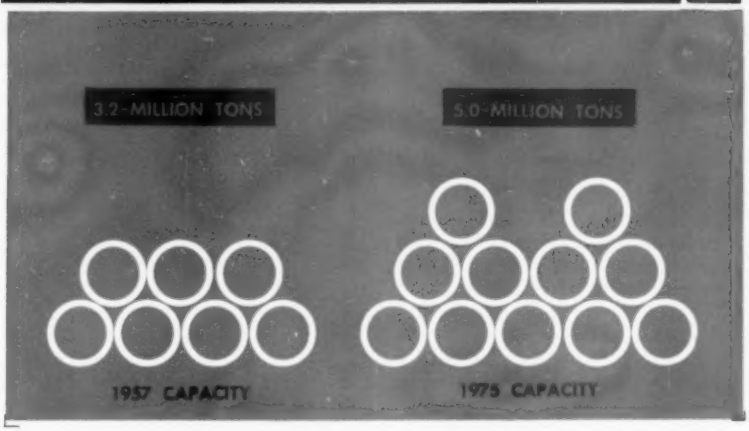
New Drilling Peaks Predicted

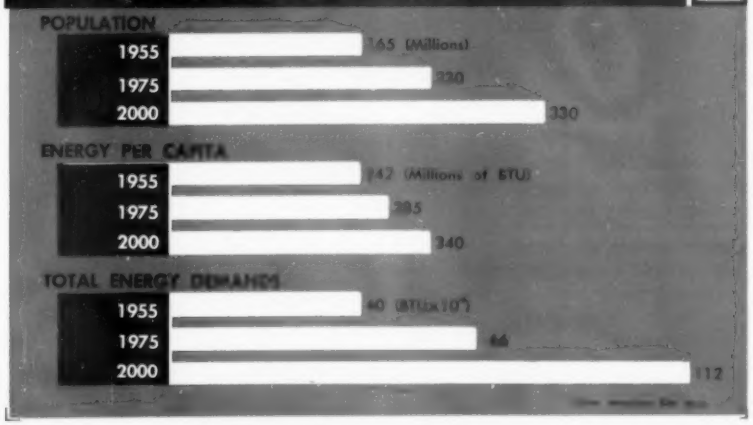
Range of Drilling Estimates 1



Oil Country Goods 2



Growth of Population and Energy Demands 3



New record levels in drilling activity are likely by the mid-60s, says W. P. Carlin, economist for Republic Steel Corp.

Carlin bases this optimistic view on a new study by Republic in which a cross-section of domestic and foreign producers, trade associations, consultants, and others, are canvassed.

Republic had made a previous study, called "U.S.A. Tomorrow," a little over a year ago. It showed a bright future for oil—and, thus, for oil's demand for steel.

But a few months later, a report from another source indicated that the oil industry was virtually "over the hill." This pessimistic report, coming at a time of depressed activity in the petroleum industry, led Republic to take another look at its own optimistic forecasts and plans.

If the outside report was right, said Jay Owings, sales manager of Republic's Pipe Division, "we'd better plant geraniums in our pipe mills instead of improving them."

The new Republic survey indicates that, while the record 58,271 holes drilled in 1956 was above the long-term trend, "we will be exceeding that past record by the mid-1960s."

What does the new survey show?

"First and most important. Let's get it straight—the oil and gas industry has a lot of growth ahead. We must not let the past year or so of tough times hide that from us," says Carlin.

"Even the least optimistic companies look for well drilling to equal past records," he adds.

"One rather logical study on the low side suggests that a maximum of 65,000 wells per year could be reached in the late 1960s, and after that there should be a gradual decline in domestic drilling," Carlin reports.

"However, the most optimistic reports anticipate that a level of 85,000 wells per year will be reached by 1975.

"Most companies fall between these last two estimates" (chart 1).

Carlin says a conversion of these figures to steel requirements points to a demand that may exceed 5-million tons of oil country goods by 1975.

This compares with a present capacity of 3.2-million tons (chart 2).

Converting the drilling estimates obtained in the new survey on the basis of present per-well use of steel

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shows that some 3-million or 4-million tons of steel per year would be required.

"But actually, as we go further into the future," Carlin says, "we would have to raise these total estimates by a considerable amount, because we can expect the wells to be deeper and to take more steel per well.

"That is why, in our opinion, a requirement of perhaps as much as 5-million tons may be reached."

Another big conclusion: Domestic petroleum demand is starting to turn up and should show considerable improvement next year.

Carlin notes that, when domestic demand rose only about 0.2% in 1957 after years of much larger gains, such as 9% in 1955 and 4% in 1956, stocks built up quickly to excessive levels, and this backed up on production and drilling.

A look at the current situation, however, shows that inventories of both crude and refined products have been brought down to much more reasonable levels.

When crude production rises, it will help profits, and this, in turn, should benefit drilling.

Carlin says the lowest estimates obtained on future demand would require a 2½% increase per year in domestic production, assuming that imports meet about 20% of total demand.

The highest estimates suggest a 4% to 5% annual increase.

Carlin says the 48,000 wells expected to be drilled this year would make "a pretty prosperous year except for comparison with 1956."

"Suppose in 1959 we should see 50,000 wells drilled—not an impossibility—and all the pipe for those wells came from the mills instead of off the shelf.

"It would mean a 2.5-million-ton year—right up with the best on record."

The Republic economist cites a long-term forecast by the National Petroleum Council, which says that it would be necessary to drill from 41,000 to 50,000 wells per year just to maintain productive capacity at the January, 1957, level.

But with demand expanding, as it must, says Carlin, "we will need additional productive capacity and must also increase our reserves."

More people, and more power for those people to use, are basic concepts behind the over-all growth pattern, the survey finds.

To back this up, Carlin quotes figures compiled by the American Gas Assn.—but says he could have "just as well used power estimates prepared by the electric people. They expect a similar growth pattern."

AGA estimates a population of 230-million by 1975. When multiplied by the 285-million Btu. of energy expected to be needed per capita, the total energy demand shows an increase of 65% over the 20 years from 1955, Carlin says (chart 3).

All of the increase will not, of course, be met by oil. But, says Carlin, another survey—by the McGraw-Hill Economics Dept.—estimates the increase in total U.S. oil consumption in this period at 85%, of which domestic production will furnish a bit more than 50%.

So far as imports are concerned, Carlin says, "our own estimates are that a number of factors will limit them to perhaps 20% of total requirements."

Domestic production should hit its peak around 1980, based on an ultimate total recovery of 250-billion bbl., says Carlin.

He adds that it would take a big change in that recovery estimate to alter this growth pattern very much.

Carlin also notes that, "as the present world surplus of crude is reduced, economic pressures will tend to increase the cost of foreign oil.

"There is a tendency to accept too readily the discovery and drilling cost data on foreign oil without giving appropriate weight to the effect on ultimate cost of the attitudes of the governments of foreign countries involved, to say nothing of possible interference with supply.

"Finally, internal political pressures will tend to limit imports, although this is not as strong a factor as might be expected."

Despite the long-term upward trend in drilling indicated by the Republic survey, wide swings in drilling, production, and steel demand can be expected, Carlin says.

There will be years of high demand and production, and there will be bad years, too, he says.

The oil industry will be plagued from time to time with inventory problems. In some years, the reverse—a temporary short supply—will be true.

So far as steel companies are concerned, Carlin notes, there will be some years when demand will be greater than the number of wells drilled would indicate, because of steel inventory build-up and consequent increases in pressure for delivery.

The Republic Economist adds that the inventory of oil country goods should be more closely related to drilling activity in 1959 because inventories are being reduced.

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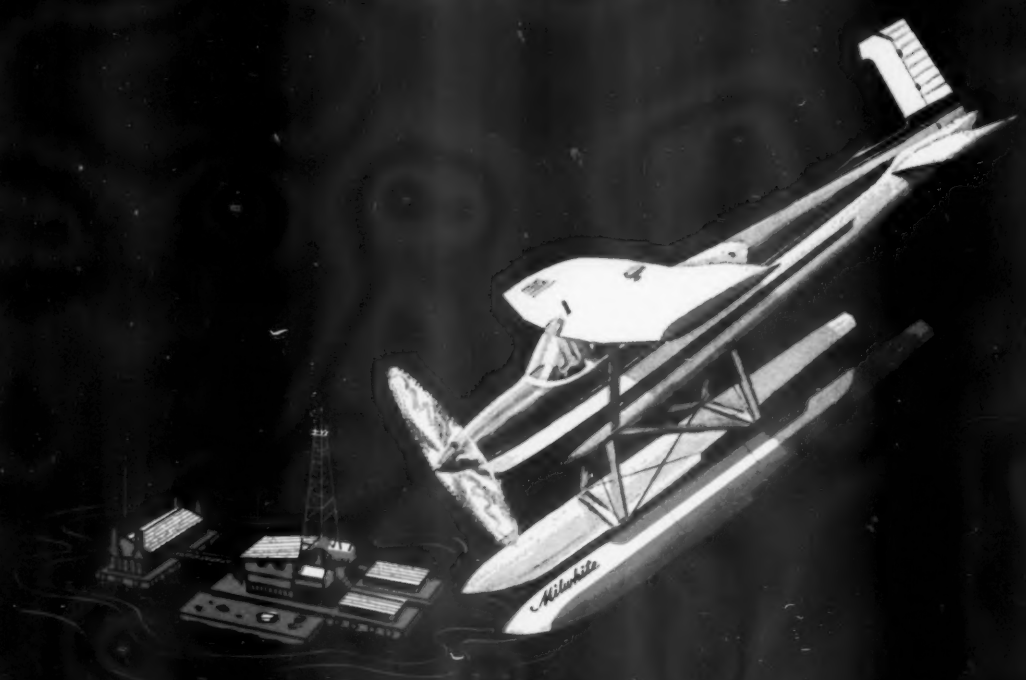

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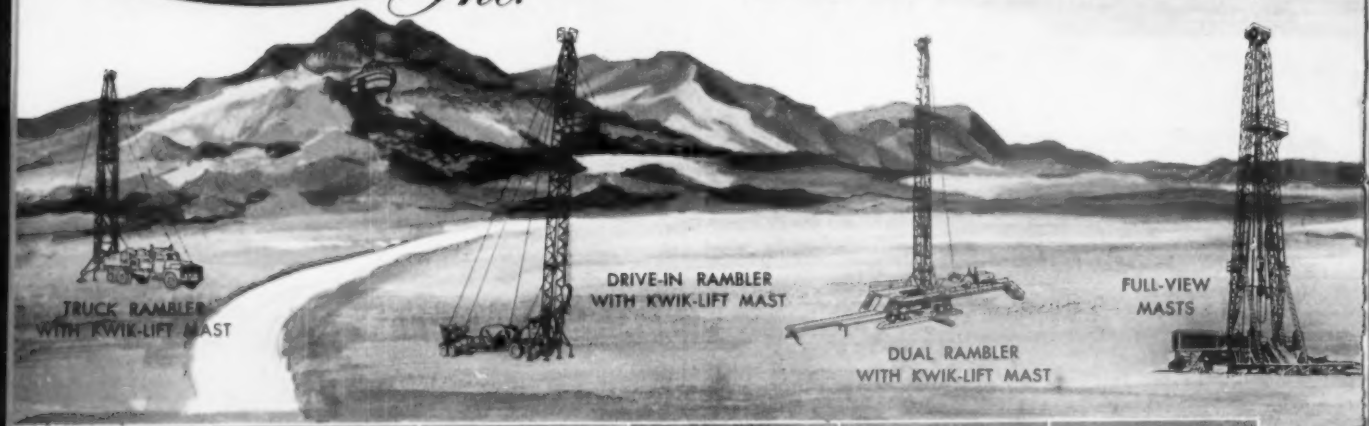

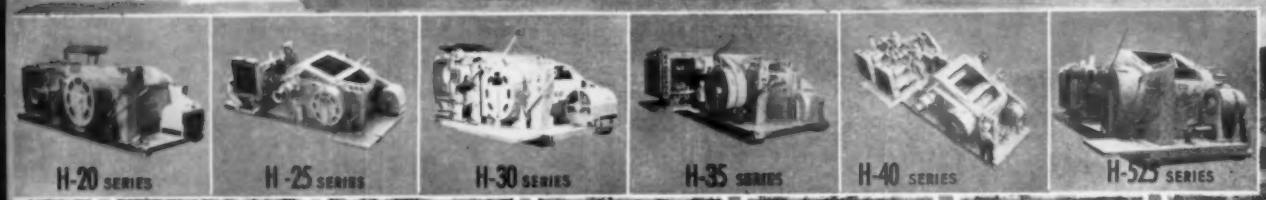

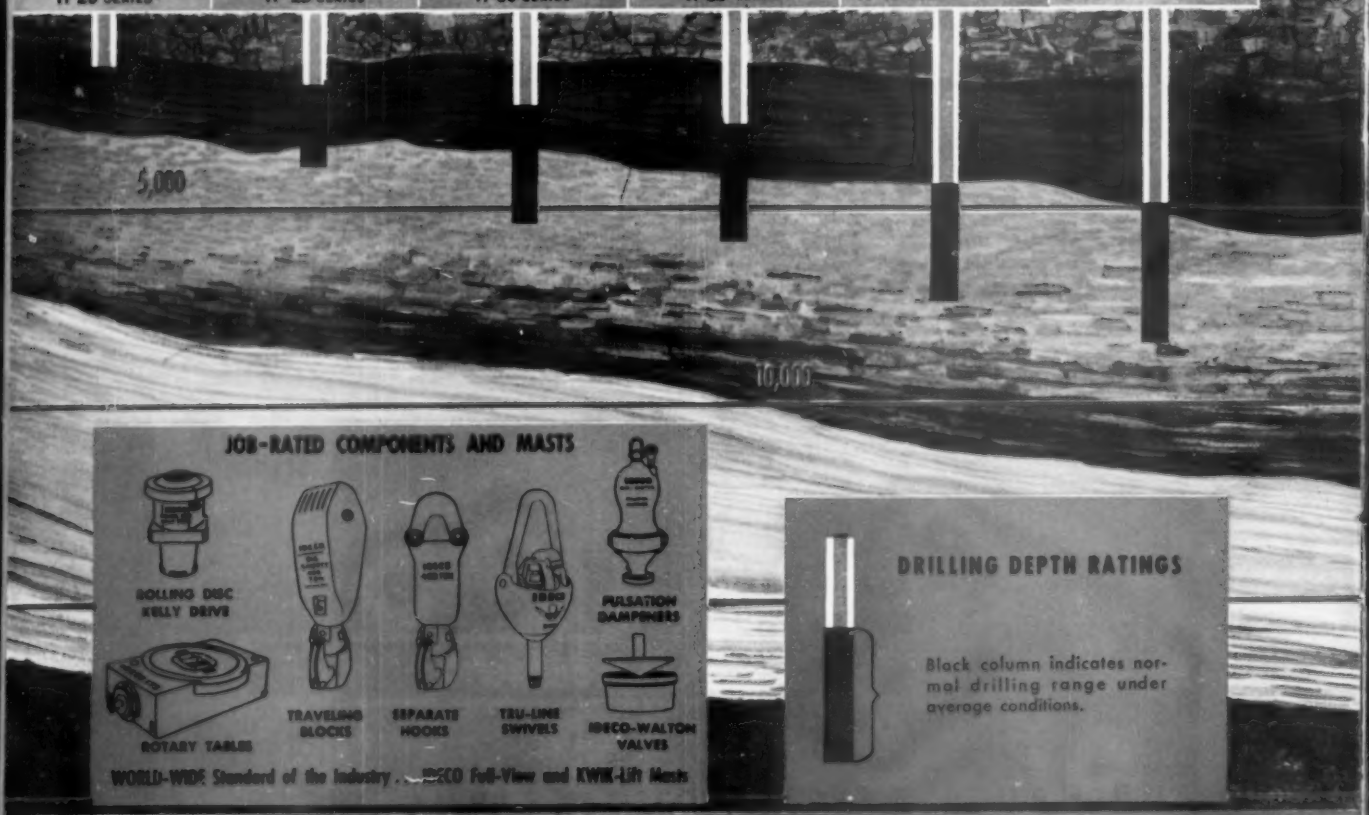

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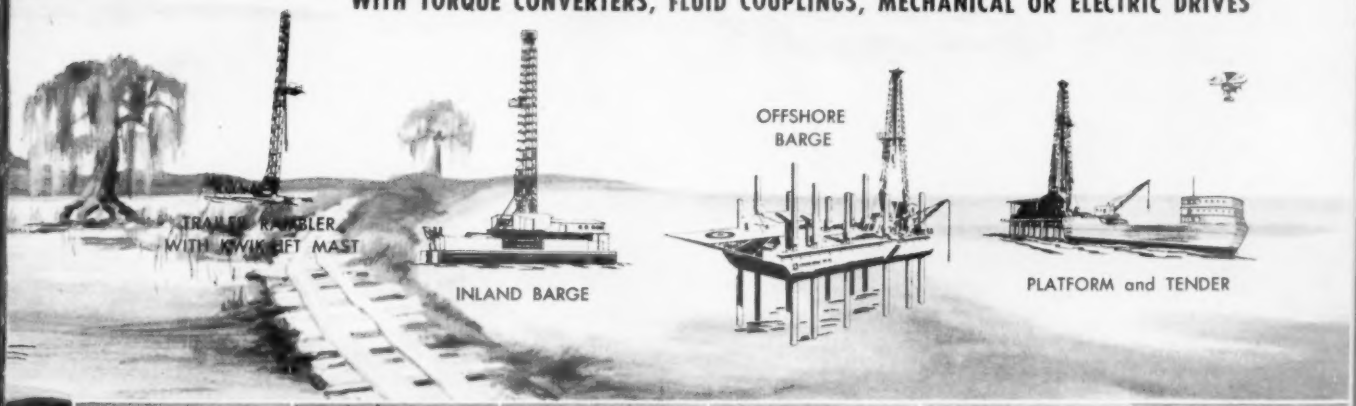

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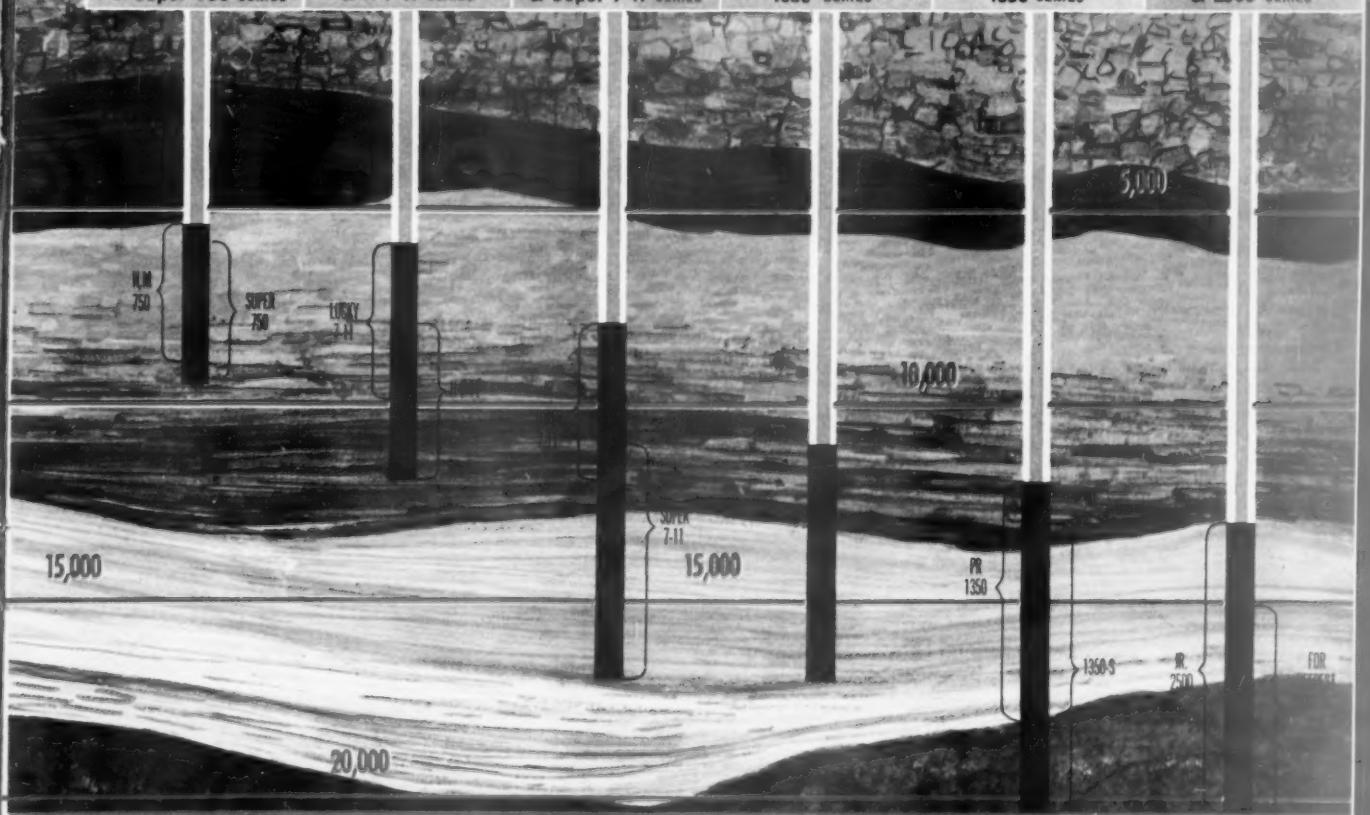

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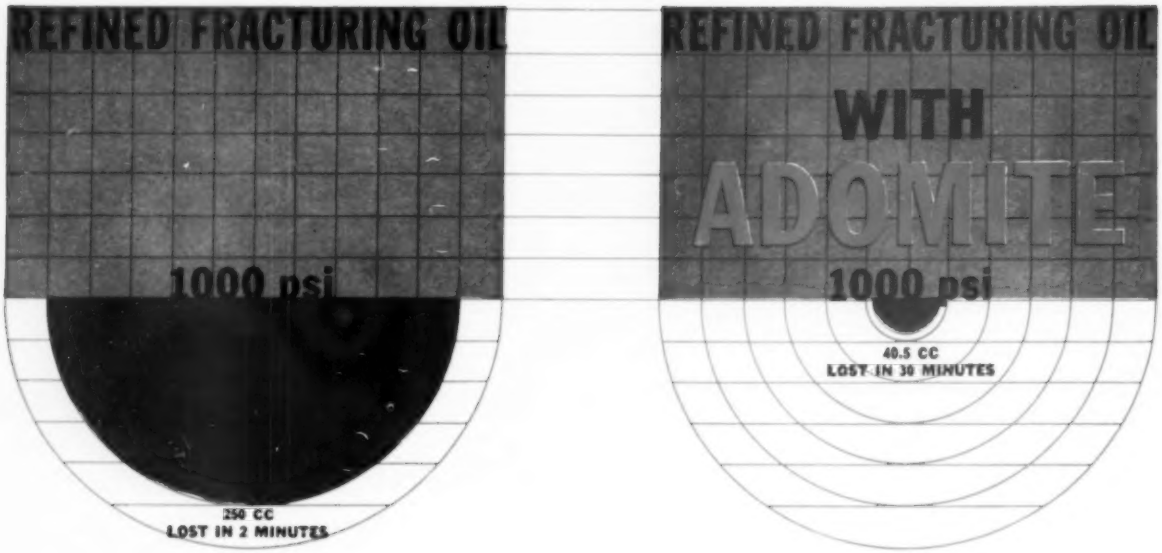

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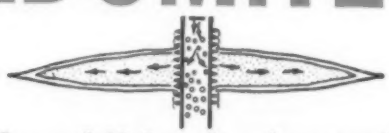

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Air/Gas Drilling, Blowout Tools Gain

Two types of drying agents give promise of effectively controlling the influx of water during air and gas drilling, according to three Pan American Petroleum Corp. research men.

B. V. Randall, J. L. Lummus, and R. P. Vincent told the Dallas meeting of the American Assn. of Oilwell Drilling Contractors this week that small or intermediate quantities of water—up to 60 bbl. per hour—can be controlled by injecting stearates or a foaming agent.

For removing small quantities of water from weeping formations, powdered stearates can be injected to prevent the "balling" of cuttings, they say.

In air or gas drilling, a small water influx—up to about 2 bbl. per hour—may cause the bit cuttings to form rings or balls in the drill pipe, causing a restriction of air or gas flow.

Laboratory and field tests were made to find a material that permitted the least amount of such agglomeration. Special grades of zinc and calcium stearate were found to impart the necessary water repellancy to the cuttings and other surfaces. These materials, the men say, are also good lubricants.

When water influx is more than 2 bbl. per hour, a foaming agent is needed to remove cuttings and water from a well bore effectively.

The primary purpose of foaming agents for removing water and cuttings is to allow continued drilling with air or gas, which, even under wet conditions, can be a faster drilling fluid than water or mud, say the Pan American research men.

Various foaming materials were tested with many types of cuttings, and with various brines, oils, and other possible contaminants.

Nonionic surfactants were found to work best for removing fresh water or any brine containing up to 5% salt and cuttings. One agent tested, Synfoam No. 1, made by Swift & Co., was found to lift water and cuttings in the presence of all contaminants except an excessive amount of salt. A modification of this agent, Synfoam No. 2, was developed to handle high concentrations of brine.

Sometimes, a combination of the two methods is necessary.

"When bore hole dampness is first indicated," the Pan Am men reported, "antiballing-agent injection should be started at once.

"If a water seepage causes balling and mud rings before the antiballing agent is injected, the hole may be cleaned by adding water plus a foaming agent to clean out the obstruction. Then antiballing agents can be added.

"When an intermediate quantity of water is indicated by a cessation of the dust flow, a foaming agent should be used. Foaming agent and water additions should be the smallest quantities which will produce constant circulation and a low even circulation pressure, in order to achieve maximum penetration rates while keeping chemical costs at a minimum."

Two new blowout closure devices have been developed to bring wells under control after a blowout has occurred.

Too often, blowout closure devices are tailored from existing equipment to fit a specific situation, say W. E. Harrelson, of Creole Petroleum Corp., and John E. Ortloff, of Jersey Production Research Co. In many cases, they say, this requires valuable time, and is at best an improvisation. Their companies' aim was to develop flexible emergency equipment for broad use.

The first is an inset-type tool, called a "stinger," which can be attached to the surface casing from the side, out of the path of the blowing stream.

The device is designed and manufactured by Baker Oil Tools, Inc., based on a Jersey patent.

The stinger is a double-acting cylinder, with a packer attached to the end of the piston rod. To shut off the flow from a well, the tool is attached to the casing and then raised to a vertical position. Hydraulic pressure is applied at the top of the piston to force the packer into the hole. After this, the well is shut in.

The total amount of time required to insert the packer and close the well is 15 to 20 seconds, assuming that the tool is properly aligned with the well bore.

The second closure device is a combination wrap-around and overshot device.

This was developed by McEvoy Co., based on an idea furnished by Jersey.

The latching-type overshot consists of two parts—a wrap-around slips-and-seal assembly, and a pressure caisson.

The wrap-around unit is installed from the side, and grips the casing. Latches then lock the two hinged parts together around the casing.

With the wrap-around installed on the casing, the overshot with a blind ram preventor flanged to its top latches automatically to the wrap-around when lowered over it.

Closing the preventor then brings the well under control.

Hughes Tool Co. Commended for Research

A plaque bearing a resolution by the American Assn. of Oilwell Drilling Contractors, commending Hughes Tool Co. for its drilling research program, was presented by J. U. Teague (center), AAODC president, to M. E. Montrose (left), Hughes vice-president, sales, and Dr. Daniel J. Martin, vice-president, engineering.

"Hughes maintains two programs," said Montrose, "One looks to the needs of the drilling industry five and ten years hence. The other is devoted to solving day-to-day problems."

Is Black Mesa Next in Four Corners?

Next door to the busy Paradox Basin is one of the biggest undeveloped regions in the country—the sparsely drilled Black Mesa Basin of Arizona. Oil men are asking: When will an active drilling play open this vast land?

This is remote, rugged, primitive country. It's comparatively isolated, but no more so than the Paradox Basin which joins it on the north, and which now is estimated to contain between 200- and 500-million bbl. of proved oil reserves.

Before 1954, the Paradox was classified as an area of oil shows, but no commercial oil. For many years, the San Juan Basin was regarded the same way. Now these two areas comprise the prolific Four Corners region.

The Black Mesa Basin, south and west of the currently active part of the Four Corners, covers roughly 30,000 sq. mi. in Apache, Navajo, and Coconino Counties, Ariz.

A geologists' survey and report of the work done so far in the Black Mesa Basin concludes that the area is a strong bidder for the next big surge of activity in the far Southwest.

A 200-page report on the Black Mesa has been compiled by Daniel S. Turner & Associates, consulting geologists and engineers, and Doeringsfeld, Amuedo & Ivey, consulting photogeologists. DAI also has completed an extensive photogeologic mapping project that covers the most significant parts of the basin.

Say the consulting firms: "In addition to structural possibilities, very substantial lithologic changes and obvious pinchout possibilities on the basin's flanks indicate that profuse stratigraphic possibilities of oil should be present. However, structural possibilities must be considered, since most of the producing fields in the Aneth area in Utah show surface structural expression."

Exploratory interest today is focused on an oil strike at the northern end of a Pennsylvanian trough, in the area dividing the Black Mesa and Paradox Basin.

Geologically, arguments as to the exact boundary of the northern limit of the Black Mesa are easy to find. Many authorities say the Paradox extends a little way southward into Arizona. Certainly, Pennsylvanian deposition similar to that in the Paradox may extend a long way into the Black Mesa, with the north end at about the Boundary Butte area on the Arizona-Utah line.

On other sides, the basin is limited on the east by the Defiance Uplift along the Arizona-New Mexico boundary, on the south by the drainage area of the Little Colorado River, and on the west by the Grand Canyon.

Only a few miles south of the Utah line, Humble Oil & Refining Co. has set pipe at No. 1-E Navajo, section 10-41n-28e, Apache County. This oil discovery flowed at rates of more than 1,000 b/d on one test of the Hermosa (Pennsylvanian) at 4,600-75 ft. On drillstem tests of other intervals, commercial quantities of oil were recovered.

Humble is scheduled to take this venture to the Devonian. It is about a mile southeast of Humble's 1955 completion, No. 1 Navajo-Tribal, section 4-41n-28e, in the East Boundary Butte field. This earlier well flowed gas with 47 b/d of oil and was classified at that time as Arizona's first commercial oil producer. Production has declined since then, and Humble geologists are ready to classify the current project as the state's first commercial oil producer, if and when it is completed. In 1954, East Boundary Butte was opened as a Hermosa gas producer by Shell Oil Co. No. 2 East Boundary Butte.

The Humble strike is 3 mi. north of a commercial Pennsylvanian gas discovery completed in 1956 by Franco-Western Oil Co.

The extreme northeast corner of Arizona is the site of all the state's production today. Extension of the drilling area to the west and south would put drillers right in the heart of the Black Mesa.

Hydrocarbon shows have been found in every rock system present in the basin. But the Pennsylvanian, according to the geologists' report, holds the most promise.

All major systems are present, with the exception of the Silurian and Ordovician.

Here's how the oil and gas possibilities line up, in the opinion of Turner and DAI:

- Cambrian: This formation is less well known than others in the basin, and has been penetrated only a few times. But shows have been found in several areas.
- Devonian: Shows have been found in Devonian rocks in several areas. "A major reservoir is a reasonable assumption for the Devonian system," say Turner and DAI.
- Mississippian: Several shows have been found at Boundary Butte and in other areas.
- Pennsylvanian: The Paradox formation is probably present over a

substantial portion of the basin. It is a major producer in Utah, and reefs and other sedimentary deposits similar to those in Utah have been noted in the Black Mesa.

Say Turner and DAI: "The Pennsylvanian is considered to have the greatest potential for oil and gas of any part of the entire geologic section."

- Permian: In this system, the Kaibab, De Chelly, and Coconino have had shows, and are listed as possible producing formations. The thicker Supai formation is also a Permian prospect for production, because almost every test that has cut the full Supai section has had shows.
- Triassic: The Moenkopi is rated as the most likely prospect in this system.
- Jurassic: Formations of this age include the Red Mesa, Navajo, and Entrada.
- Cretaceous: Cretaceous rocks are present on the surface in much of the Black Mesa Basin. But Dakota production is regarded as questionable.

Generally, surface structures, some of them of great length and substantial relief, are known throughout the basin. Only a few have been drilled. Faulting generally is of little consequence in the basin, except in one area on the west side, near the Grand Canyon.

Though drilling has been skimpy, a considerable amount of geophysical work has been done in the basin in the past two or three years.

Up to 1957, General Petroleum Corp. had gravity crews working in Apache County. Skelly Oil Co. also has had gravity crews active there, and Pan American Petroleum Corp., Phillips Petroleum Co., and Sinclair Oil & Gas Co. have done seismic work in the county.

Humble has done some gravity work in Navajo County.

In addition, 16 contract crews were active in the basin in 1957. The pattern this year is reported similar to that of 1957.

The average cost of maintaining a geophysical crew in the field in the Rockies is estimated at about $25,000 per month. Northeastern Arizona is on the high side of this average.

The Devonian is mentioned as the most readily mappable formation within the basin so far as seismic methods are concerned. The Hermosa (Pennsylvanian) is also mappable by seismic methods—fortunately so, since the Pennsylvanian is shaping up as the leading exploratory target.

What has held back the development of the Black Mesa Basin so far? The biggest reason is the land situation: The basin is primarily Indian land, and boundary disputes—as yet unsettled—have prevented widespread leasing.

The 14.5-million-acre Navajo reservation lies in Utah, New Mexico, and Arizona, with a very substantial portion in Arizona (map). The 631,000-acre Hopi reservation lies entirely within Arizona, and is surrounded by Navajo lands.

The boundary between the two has been in dispute since 1882. Consequently, except for the extreme northeastern corner of the state, where the Navajos seem to have full and clear title, little leasing has been done on Arizona reservation land.

But the interest in leasing is there. The fact that federal and state lands south of the reservations have been leased heavily in the past two years indicates that reservations lands will be extensively leased if and when they are offered.

The leasing situation should improve: A federal law has been passed that allows the land to be leased despite conflicting claims.

Public Law 85-547, signed by Presiden Eisenhower in July, authorizes either the Navajos or Hopis to bring suit before a special three-judge federal district court in Arizona to determine the boundary of their reservations. Meanwhile, the U.S. can hold in trust proceeds from these lands, pending settlement.

Despite the holdback of leasing within the main portion of the Black Mesa Basin, there has been some leasing along the northern edge. The first recorded leasing of Navajo lands in the Black Mesa was in 1945, when a bonus of 10¢ per acre was paid for a 5,120-acre tract.

In February of this year, a new bonus record was set when Pan American, Phillips, and Sinclair paid $511 per acre for a northern Arizona tract.

A total of 52-million acres of Arizona, or 71% of the state, is under some sort of federal administration. Another 15% is state land.

Besides the land tangle, the attitude of the Indians is also a factor. The Hopis are dry farmers, peaceful and given to isolation. Though their contact with the white man goes back four centuries, they are only now emerging from their shell, and only now starting to show interest in dealing with the white man.

When the land situation is cleared, the Black Mesa will be on the same threshold of development occupied by the Paradox Basin just five years ago. Oil men are wondering: Will it take five years in the Black Mesa?

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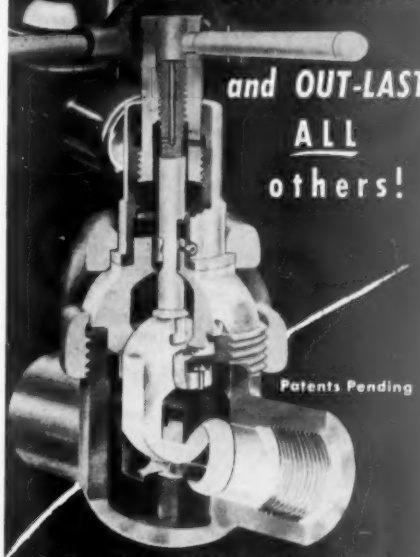

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What's New / IN EXPLORATION, DRILLING, PRODUCTION

Texas Still Has Big Unexplored Trend

Oil and gas fields may exist along the edges of a buried mountain range extending into Texas from Oklahoma and Arkansas, says University of Texas geologist Peter T. Flawn.

Flawn told the Dallas Geological Society last week that the buried range, called the Quachita structure, is the largest unexplored trend in Texas. He explained that the range goes underground in northeast Texas, arches into the granite country in South Central Texas, and reappears again in the Marathon Basin of Southwest Texas.

The recent discovery of a gas field along the northern margin of the structure in Terrell County, West Texas, has sparked interest in similar areas along the belt, he said.

"Frontal structures of the belt may contain commercial deposits of oil and gas, particularly deep gas," he said.

"There is no commercial production in Texas from Ouachita rocks," he said, "because the belt's structural complexity makes it difficult to locate prospects by geological or geophysical means."

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Leasing News

The provincial government has received $74,017 for leasing 27,520 acres in southern Saskatchewan.

One tract in the relatively unproven Willowbunch area, totaling 8,000 acres, was leased by Mobil Oil of Canada, Ltd., for a bonus of $32,320.

Husky Oil Co. was high bidder at a sale of leases on federally-owned lands in Wyoming.

Husky paid a bonus of $52 per acre for a 4-acre tract in the Big Polecat field, Park County.

Stark County attracted the highest bonus bids at two North Dakota lease sales in September.

At a School Land Board sale Sept. 17, R. O. Smith paid $32 per acre for a tract in the county. This offering included 110 tracts, totaling 25,349 acres, all of which were leased.

At a Bank of North Dakota sale Sept. 16, Tennessee Gas Transmission Co. and Bruce Alfson paid $3.75 per acre for seven tracts in Stark County. At this sale, 11,372 acres were leased for $15,594.

Texas Land Boards, except the University Land Board, will hold a sale of oil and gas leases in December.

Land Commissioner Bill Allcorn asks prospective bidders to submit bids by Oct. 15.

Exploratory interest in the Athabasca tar sands region of Alberta has dropped to a low point.

On Sept. 18, the Alberta government offered a prospecting permit covering nearly 50,000 acres in the tar sands area. There were no bidders.

•

Union Pacific R.R. has filed a suit asking that Colorado's income tax on oil and gas production be declared unconstitutional.

In a suit filed against Robert A. Theobald, state director of revenue, and Homer F. Bedford, state treasurer, Union Pacific charges that the tax, ranging from 2% to 5% on gross income from oil and gas production, discriminates against the large operator. The railroad is a major operator in the Rangely field.

The railroad seeks a refund of $385,235 in taxes paid in 1953 and 1954.

A similar suit awaits trial in the state Supreme Court, on an appeal from the Denver court, which upheld the legality of the tax. This suit, filed by The California Co., seeks a refund of nearly $1-million of taxes.

Since the tax was enacted in 1953, the state has collected more than $15-million in revenues.

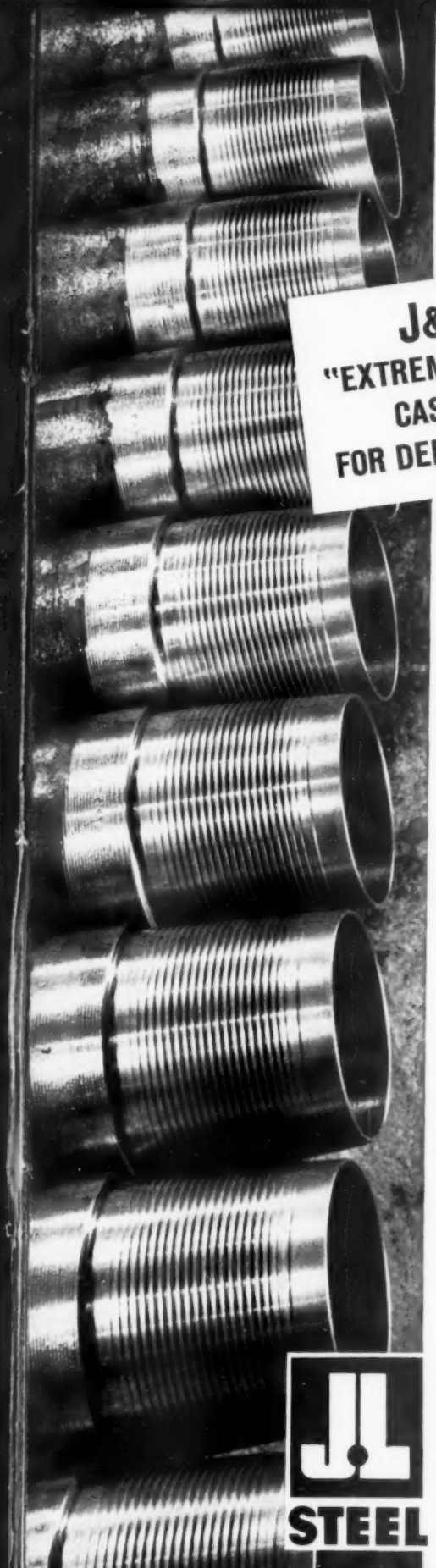
•

While the drilling of unprofitable wells separates a man from his money, it doesn't always take away the operator's sense of humor.

W. H. Hudson, an independent producer from Dallas, drilled a well in Wise County, North Texas. After drilling to 6,503 ft., he completed the

Coming Offshore: Wide-Base Platform

Engineers at R. G. LeTourneau, Inc., check a working model of a wide-base-type offshore platform. Vice-president R. L. LeTourneau (center), says the angled legs offer great platform stability and operational flexibility. The company might build such a platform later this year, which, he said, could operate in water depths of 100 ft. to 600 ft. Others inspecting model are Sherman Barber (left) and W. G. Roberds (right), company engineers.



J&L "EXTREME LINE" CASING FOR DEEP WELLS

High strength J&L Extreme Line casing was used as bottom-hole liner in this Shell Oil well in Louisiana.

J&L Extreme Line Casing provides leak-resistant bottom-hole liner for Shell Oil well

Over 1500 feet of 7-inch J&L Extreme Line casing were used as bottom-hole liner between 10,788 and 12,288 feet in this Shell Oil well in the Humphreys field near Gibson, Louisiana. "Extreme Line casing was used for its increased clearance and high leak resistance," said Shell Oil drilling superintendent.

J&L Extreme Line casing, produced under license from The National Supply Company, offers these important advantages:

HIGH JOINT STRENGTH. Modified Acme-type threads, with a steep flank angle, assure strong interlock. Integral joint eliminates coupling.

POSITIVE LEAK RESISTANCE. Accurately machined metal-to-metal surfaces provide a positive seal.

INCREASED CLEARANCE. Reduced outside diameter of joints provides necessary clearance in a tight hole.

HIGH RUNNING SPEED. Running rates are up to 50% faster. Broad, flat-crested threads guide pin end quickly into engagement without cross-threading. Joints are made up with two to four jerks after spinning.

Investigate the unique features of J&L's Extreme Line casing, available in J-55, N-80 and P-110 grades. Ask your J&L distributor or write to Jones & Laughlin, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

This L. D. Riggs No. A-2 well was drilled to 12,300 feet with a large steam drilling rig. 1500 feet of 7-inch 29# P-110 Extreme Line casing was used. Shell also used 2987 feet of 13⅜-inch and 7089 feet of 9⅝-inch N-80 J&L casing in this well.

J&L STEEL

Jones & Laughlin Steel Corporation

PITTSBURGH, PENNSYLVANIA

well in a pay topped at 4,578 ft. for a potential of only 24 b/d of 42-gravity crude with a gas-oil ratio of 435 to 1.

Hudson requested that the Wise County field be named "Unwise." The Texas Railroad Commission granted his request.

•

The Justice Dept. has approved a Navy Dept. contract with Intex Oil Co. for offset drilling at the Teapot Dome reserve in Wyoming (PW—Aug.8'58,p29).

The contract has been sent to the White House for clearance.

•

The Texas Railroad Commission has issued permits for triple completion of two oil wells in North Monahans field, Winkler County, West Texas.

One is Pan American Petroleum Corp. No. 31-A Scaly-Smith Foundation; the other is The Texas Co. No. 3 G. D. Hogg.

The wells will be equipped to produce simultaneously from three oil reservoirs between 9,940 ft. and 12,100 ft.

The Texas Railroad Commission has approved an application by Conka Production Co. to start a thermal recovery project in Brown County, West Central Texas.

The in-situ combustion process will be carried out in the Fry (Strawn) sand, under the company's A. J. Newton lease in the Brown County Regular field.

•

The Saskatchewan Oil & Gas Conservation Board has approved the unitization of the Gull Lake North Shaunavon pool for a waterflood.

Permission was granted to six companies with 34 wells in the field. The flood is expected to boost recovery from 18% to 49% of oil in place.

•

The U.S. Geological Survey has approved the 23,095-acre Mud Lake unit, Sweetwater County, Wyo.

Ohio Oil Co. is operator of the block, which lies 15 mi. northwest of gas production at the Desert Springs unit.

USGS has also approved Mountain Fuel Supply Co.'s Horn Canyon unit, totaling 22,431 acres, in Sweetwater County.

A burning oil well in Sumner County, Kan., has been extinguished after six days.

A 100-lb. charge of nitroglycerine was used to shoot out National Refinery Assn. No. 1 Eshelman, section 24-34s-2w, about 2 mi. southeast of Corbin field. This was the first major oil fire in the state in several years.

•

Shell Oil Co. has asked the Montana Oil & Gas Conservation Commission for permission to conduct a pressure maintenance program on the Pine unit in Wibaux and Fallon Counties.

An estimated 8,000 b/d of water would be injected into the Stony Mountain and Red River producing zones.

•

Drilling Highlights

West Texas—Pan American Petroleum Corp.-Ard Drilling Co. No. 13 Masterson, section 152, block A, W. J. Montgomery survey, King County, recovered gas at the rate of 7-million cu. ft. daily and distillate at the rate of 273 b/d through perforations at 5,275-350 in the Mazda-

AUTOCAR PICKED FOR ANOTHER TOUGH JOB

On its way to the remote Chaco jungle oil field explorations in Paraguay, this Autocar was one of the first trucks on the job for Pure Oil Company. The six wheel drive Autocars are specially designed for rugged work in the petroleum industry and have a great reputation everywhere for dependability and performance—year after year.

It's AUTOCAR—*for extra earning power*

Autocar Division, The White Motor Company, Exton, Pa.

Finley reef. The discovery is 13 mi. northeast of Bateman Ranch field.

In Pecos County, Duncan, Hamm & O'Brien and Edwin L. Cox No. 1 Wilson, section 26, block 12, H&GN survey, was completed for 312 b/d of 40-gravity oil through 18/64-in. choke and perforations at 5,804-46 ft. The discovery is more than a mile southwest of East Tippett field.

In Garza County, General American Oil Co. No. 1 Susie Koonsman, section 5, block 2, T&NO survey, was completed for 333 b/d of 40-gravity oil through 8/64-in. choke from openhole in the Ellenburger at 8,175-85 ft. Completion also is being made from the Strawn. The discovery is 2 mi. southeast of Happy field.

Mississippi—Central Oil Co.-Lone Star Producing Co. No. 1 Masonite Corp., section 25-10n-10w, Jones County, was completed for 30 bbl. of oil per hour through 12/64-in. choke and perforations at 10,710-14 ft.

North Dakota—Skelly Oil Co. No. 1 Tank, section 34-152n-96w, McKenzie County, flowed 48 bbl. of 40-gravity oil in 4½ hours on drillstem test at 9,167-97 ft. in the Madison. The wildcat is 3 mi. west of Blue Buttes pool.

Northwest Louisiana—Shell Oil Co. No. 1 Louisiana Long Leaf Lumber Co., section 18-6n-12w, Sabine Parish, was completed as a Chalk discovery for 132 b/d of 41.2-gravity oil and 60,000 cu. ft. of gas daily through ¼-in. choke and perforations at 2,840-900 ft. The discovery, drilled to 7,978 ft. and plugged back, is 6¼ mi. south of Zwolle field.

New Mexico—Atlantic Refining Co. No. 1 Lowe Land Co., section 24-13s-37e, Lea County, flowed 149 bbl. of 40-gravity oil on 11-hour test through ¼-in. choke and perforations at 9,838-62 ft. in the Permo-Pennsylvanian. The discovery is 1 mi. north of King field.

California—Signal Oil & Gas Co. No. 1 Signal-Richfield-Rancho, section 36-1s-15w, Los Angeles County, flowed at rates up to 1,010 b/d on production tests of a zone at about 9,500 ft., apparently marking a new townlot discovery on Rancho Park in Beverly Hills. Total depth of the test is 12,688 ft.

Texas Panhandle—The Texas Co. No. 1 Anna Frass, section 73, block 10, HT&B survey, Lipscomb County, flowed 304 b/d of 47.5-gravity oil through ½-in. choke and perforations at 7,903-14 ft. in the Atoka lime.

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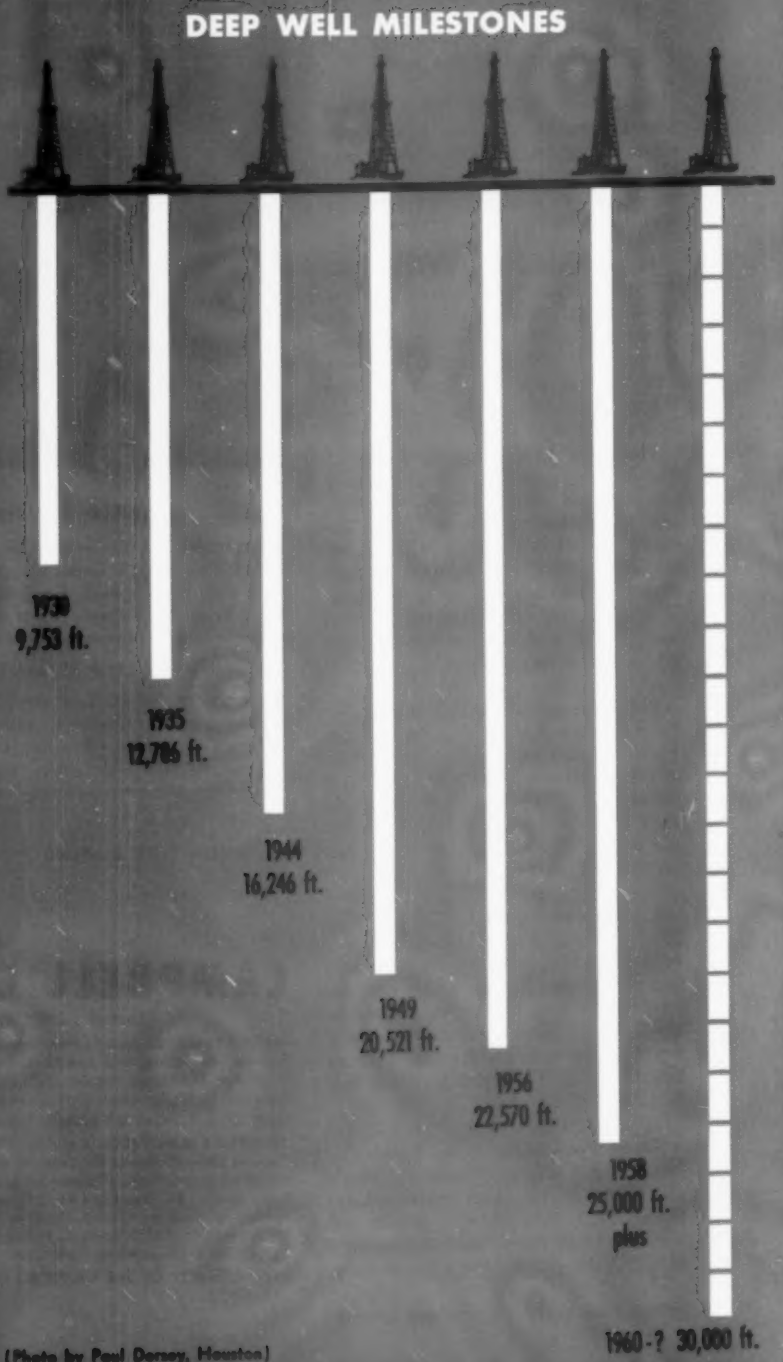
The 25,000-ft. Hole



(Photo by Paul Dorsey, Houston)

Ushers in a New Drilling Era

Now that the 25,000-ft. barrier has been breached, attention in the drilling industry already is turning to the next major milestone – 30,000 ft.

One significant fact underscores the drilling of today's very deep holes: Equipment available now is capable of doing much more than it's rated to do.

Deep drilling in the United States and Canada has taken some significant strides forward this year. Probably the outstanding development is the arrival of the 25,000-ft. hole.

The advances made during a year of financial stress have been of evolutionary character. There has been no major technological breakthrough in deep-drilling equipment or technique.

But the cumulative impact of scores of improvements and changes may have an almost equal effect, over-all, on the industry. The drilling of a 25,000-ft. hole is, in itself, a major milestone in the history of drilling operations.

Yet only as recently as the end of World War II, some drilling "experts" contended that holes couldn't be drilled much below 20,000 ft. "unless you give us some revolutionary way to drill a well and eliminate drill pipe and rock bits, because the pipe and rigs just won't take it."

While several holes have been drilled past the 20,000-ft. level this year, the significant fact is the routine manner in which the operations have been carried out.

It is true that wells were drilled to 20,000 ft. and deeper as far back as 1949. But never have so many superdeep holes been drilled in one year. Nor have such holes been drilled with such an "all-in-a-day's-work" attitude as those drilled this year.

"No revolutionary departures have been necessary in equipment design or in drilling techniques to drill these latest superdeep holes," says one company official.

This lends support to a point long emphasized by drilling people and equipment manufacturers: Equipment currently available is capable of doing much more than it is actually rated to do.

Drilling of today's superdeep holes has been made possible primarily because of three factors:

- **Properly trained men, with the know-how to get a tough job done.**

The statement that "the man's the thing" has never held more true than in the case of these superdeep ventures. "Proper training of drilling crews, careful selection of your drilling engineers, and a good job of supervision are important in performing any successful deep-drilling operation," say more than one drilling contractor and operator.

- **Drilling equipment that can take it.**

Such equipment, and related service equipment, that is now available has the stamina and dependability needed to offset the tremendous stresses and strains, the high temperatures, and the very high pressures encountered in superdeep holes.

- **Ceaseless drilling research.**

This research takes in all kinds of drilling problems, not just those that may crop up in very deep drilling. Such research has been implemented by cooperative effort among contractors, producers, various engineering societies, and the manufacturers of drilling equipment.

The current crop of very deep holes has toppled all sorts of drilling records. Here are some of them:

- **A new world's depth record has been set.** Late last week, Phillips Petroleum Co. No. 1-EE University, Pecos County, West Texas, had reached 25,000 ft., far below the 22,570-ft. mark that had stood for more than two years.

- **The longest string of casing was run.**

A combination string of 7⅝-in. and 7-in. protective casing was placed successfully at 22,919 ft. in a "routine" manner in the No. 1-EE University.

continued ▸

SPECIAL REPORT
DRILLING

VAST QUANTITIES OF PIPE were used in casing the world's deepest hole—the Phillips No. 1-EE University, Pecos County, Tex.

• **The longest string of drill pipe was used**—in the Phillips record-breaker. The 25,000-ft. string of 4½-in., 4-in., and 3½-in. pipe performed "excellently," says the operator.

• **The deepest whipstock ever attempted was successful**—at 19,965 ft., again in the No. 1-EE University.

• **The deepest single-stage squeeze-cementing job was carried out**—at 23,000-400 ft. in the Phillips No. 1-A Montgomery, also in Pecos County.

• **The deepest acidization jobs were performed**—at 22,667-805 ft. in the No. 1-A Montgomery.

• **The world's deepest well-testing was performed**—below 22,600 ft. in the No. 1-A Montgomery.

• **The straightest deep hole was drilled.** Shell Oil Co. No. 5 Rumberger, Beckham County, Okla., deviated only 176 ft. off vertical at a depth of 20,000 ft.

• **The deepest electrical logs were run**—at 23,000 ft., under extremely high pressures and temperatures, in the No. 1-A Montgomery.

But today's records, impressive as they may be, are destined to fall in the near future as contractors and operators press their hunt for new oil reserves.

No one knows just where the stopping point will be, of course.

"As long as there are deeper sedimentary basins to be explored," says one operator, "and as long as there is a chance of raising the funds to test them, then there will always be a hole drilled a little deeper in an attempt to explore them.

"It's much like the mountain-climber who, when asked why he climbed a particular mountain, replied: 'Just because it's there.' That's the way the drilling industry looks at these sedimentary basins.

"If it takes a 30,000-ft., or 40,000-ft. hole—yes, even a 50,000-ft. hole—to get to the bottom, then you can bet your last dollar that some day these sediments will be poked with holes."

Equipment available now, in the hands of people who are trained to use it correctly, should be able to drill on down to 30,000 ft. without too much trouble, say some operators.

Now that the 25,000-ft. milestone has been attained, it's anybody's guess as to what lies ahead.

"It's easy to figure," says one contractor, "that if holes can be drilled today down to 25,000 ft. with rigs that are rated at only 18,000 ft. to 20,000 ft., then 30,000-ft. holes can be drilled with rigs rated at 22,000 ft. And such rigs are on the market right now."

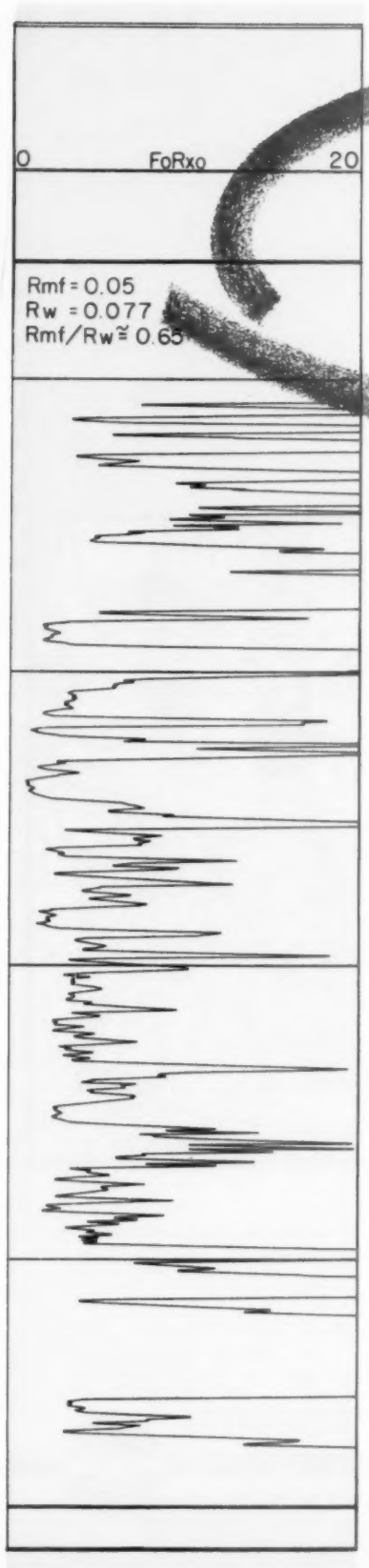
Drilling contractors are confident that any new problems that may crop up in drilling to the next major target—30,000 ft.—will be met and solved.

Complicating the picture is the fact that each hole poses individual problems. A 20,000-ft. test in one area may not be as easy to drill as a 25,000-ft. test in some other location.

When will a 30,000-ft. hole be drilled? Possibly within a few years, according to some drilling experts, provided there is sufficient incentive to drill it. But most of these experts believe that the lure of potentially large new petroleum reserves will be too great to pass by.

One operator says: "It's going to take big money. But, as usual, somebody will raise it, just as long as there are unexplored portions of deep sedimentary basins with production possibilities.

"After all, the oil we're finding now is not going to last forever. We're either going to have to continue probing deeper for it, or find some sort of substitute for



FoRxo

(Focused Resistivity)

Porosity Determination is Simple with Welex FoRxo Log

There is no other logging device in the oil field today that can so accurately distinguish vertical changes in lithology as the Welex FoRxo. This logging device, as its name implies, measures directly the resistivity of the flushed mud filtrate invaded zone—Rxo. At the same time, it also records an SP curve and a Caliper curve.

By focusing current from a pad which is held against the side of the hole, the measurement of Rxo is accomplished. The conversion of Rxo to porosity is a simple step.

The Welex FoRxo Log, in conjunction with the Welex Guard Log (which is focused deep in the formation to read true resistivity—Rt) provides an unbeatable Production Guide for those difficult-to-analyze wells where formations and mud resistivities are similar. Thin beds, shaly sands, rapid lithological changes all are easier to analyze with this combination of Welex logs.

The Welex FoRxo Log is another Welex Production Guide that has earned the confidence of oil men everywhere.

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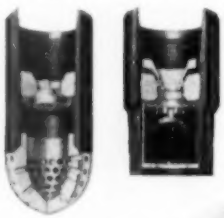
RECTOR TYPE "O" FILL SHOE and COLLARS HELP SET CEMENTING RECORD IN WORLD'S DEEPEST WELL

.....SAFELY!

BULLETIN: Phillips Petroleum Co. has successfully run and cemented casing to 23,000 feet in its Montgomery A No. 1 well in Pecos County, Texas, to break the world's depth record for casing and cementing previously established by the same company in its 1-EE University. Again Rector Type "OP" fill shoe and Type "O" fill collars were used to set the new record... safely!

PHILLIPS PETROLEUM CO. set two remarkable records with its world's deepest well, the 1-EE University in Pecos County, Texas, recently when it ran 22,919 feet of casing, the longest string ever run, and cemented a column 18,819 feet high in the hole, another record. And a Rector Type "OP" fill shoe with three Type "O" fill collars were used to help accomplish this amazing feat... *safely*... in a record overall time of 28 hours.

Whether your well is the world's deepest or a routine operation, the Rector Type "O" fill shoe is the *safest* you can use if there is any danger of sticking pipe. With the Rector Type "O" automatic fill shoe, you can stop running pipe and circulate the well as often and for as long as needed... and then resume running pipe with controlled orifice fill after circulating. Only Rector offers this exclusive safety feature.



Specify Rector equipment in your next cementing program. See your favorite supply store – or ask a Rector man for details.

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crude—or be dependent on imports. And we don't want that by any means."

Too, there seems little doubt now that oil can, and will, be found at depths of 30,000 ft. or more. Some geologists believe there are sedimentary basins as deep as 60,000 ft. to 80,000 ft. It also has been proved that there is good porosity below 20,000 ft., and many geologists believe the same will hold true at 30,000 ft. and deeper. Hence, the barriers, to deeper and deeper drilling are not geologic, but rather economic and mechanical.

What are some of the problems that would be involved in drilling a 30,000-ft. hole right now? One of the big ones—which can be whipped, operators say—is development of tubular goods of adequate tensile strength.

"A great deal of work must be done on high-tensile pipe," says one engineer. "The yield is satisfactory enough now, but more ductility is needed." He cites examples where drill pipe has twisted in two, resulting in costly fishing jobs on some recent deep tests.

"The tubular-goods manufacturers are working on this problem now, and they'll be able to give us what we need soon," he says.

"But we feel that this is the biggest problem in getting down to 30,000 ft."

One major steel supplier has reported development of a superdeep-well casing, which has a minimum yield strength of 150,000 psi. This casing, now being field-tested, was developed primarily for use in deeper combination strings in order to avoid excessively heavy walls and consequent decreases in inside diameter.

This same company also is field-testing a drill pipe with a yield strength of 135,000 psi.

Another problem will be the requirement that drilling fluids be able to stand up under all sorts of adverse conditions.

Some excellent products are already on the market, say operators, and undoubtedly they'll be the first used in any 30,000-ft. test because of their performance to date.

Still, more research is needed in this field to develop muds that won't ball up or dry out at temperatures that may approach 600F. Indications are, however, the drilling fluids will not be a limiting factor to future drilling of superdeep wells.

As with mud, improved cement and cementing techniques also will be vital in superdeep operations.

It's a known fact that the deeper a hole is drilled, the higher the temperatures that are found. And the hotter it gets down below, the quicker the cement sets.

But there are some products on the shelf today, according to some operators, which will, with refinements, be successfully used on a 30,000-ft. hole.

In addition, there will be such problems as pipe-handling, logging, perforating, and the like.

Some modifications and improvements of rigs are likely. Slush pumps are available to handle a 30,000-ft. test, according to manufacturers. As for other on-the-surface equipment, "it's just a matter of 'beefing up' what we have now," according to one engineer.

The economic factors involved in superdeep ventures probably will comprise the biggest barrier.

"You just don't go drilling very deep wells for the hell of it," says a contractor. "First, you've got to convince your stockholders that such a project will pay off—either in production or valuable geological information."

A 30,000-ft. test could cost anywhere from $3-million to $6-million, "depending on how much trouble you run into, whether you have a lot of downtime, and so forth," says an operator.

And then, there is always the skeptic, like one Oklahoma contractor who says: "Don't talk to me about going to 30,000 ft. until oil is selling for $40 a barrel."

Some industry leaders already are thinking about the possibility of a 50,000-ft. hole. We may not see it in our lifetime, but most operators feel it will come some day.

An industry symposium was held on this very subject early this year (PW—Jan.17'58,p31). Sponsored by the South Texas Section of the American Society of Mechanical Engineers, the symposium considered whether such a deep hole could be drilled. The discussion was set up following a claim by the Soviets that they can do just that right now.

The panel consensus: We can't do it, and neither can the Russians—now.

But the discussion brought out some interesting points as to problems that would be likely to occur in such an operation. Among some of the equipment and techniques that would be needed, the panel agreed, are:

- Giant casing sizes, perhaps starting off with a 24-in. pipe with a .687-in. wall
- Supertough drill pipe, in large sizes.
- Super slush pumps of up to 5,000 psi. working pressure.
- New pipe-handling techniques, including a way to ease the load concentrated in the slip area.
- Bigger, stronger derricks to handle heavier loads and longer strings, and to rack more pipe.
- Bigger blowout preventers.
- Better instrumentation on the derrick floor.
- Better drill bits.
- Improved drilling muds and cements (to offset bottomhole temperatures that might range from 700F to 1,080F), testing tools, and completion methods.

What are the ultimate limits to deep drilling? This may largely be determined by success or failure of efforts in the next decade, says C. E. Reistle, Jr., executive vice-president and director, Humble Oil & Refining Co.

Writing in the company's house-organ, "The Humble Way," Reistle said further: "Investors and oil-industry management are keeping pace with geologists, who believe oil is present at great depths, and with engineers, who believe the mechanical and technical problems can be solved.

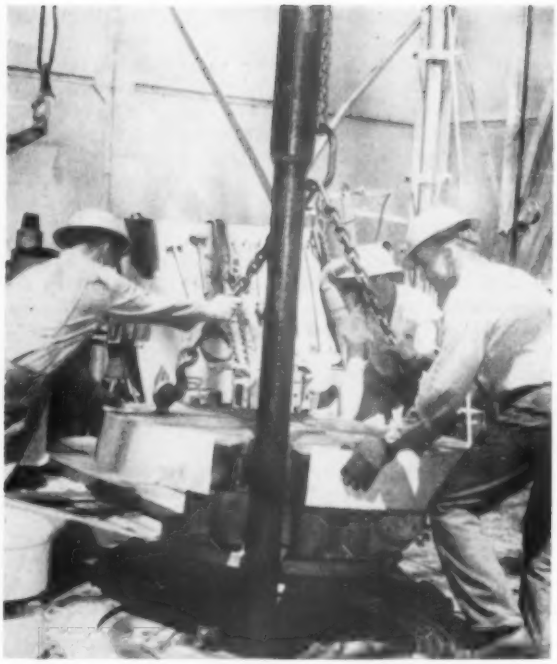
"These facts point to a continuing trend to drill deeper and deeper wells in the years ahead."

Reistle said Humble's exploration department had taken a ten-year look ahead on the subject of deep drilling, and had come up with these projections for California and the Gulf Coast area:

- There will be a 90% increase in deep wells (10,000 ft. and deeper)—from 2,301 in 1956 to 4,043 in 1965.
- There will be a 600% increase in deep-deep wells (16,000 ft. and deeper)—from 47 in 1956 to 332 in 1965.
- There will be an 1,100% increase in extra-deep wells (18,000 ft. and deeper)—from 7 in 1956 to 82 in 1965.

continued ▶

GIANT CEMENTING PUMPS were required to form a cement ring more than 3½ mi. high in the No. 1-EE University.



SPECIAL HYDRAULIC CUSHION was developed by Phillips to ease strains and stresses on the No. 1-EE drill pipe.

Today's Focus Is on Five Deep Tests

Three deep tests in West Texas and two in Oklahoma have attracted the lion's share of current industry interest in deep drilling.

A check of drilling contractors across the country shows that most of them have their eyes on five deep tests in Texas and in Oklahoma.

These tests are considered the most significant today from the standpoint of proving men and equipment at critical depths.

These five holes have broken all sorts of drilling and testing records in the past few months. Three of them are located in Pecos County, West Texas; the other two are in Oklahoma. The five important tests are:

• **Phillips No. 1-EE University,** Pecos County, the world's deepest man-made hole (drilling below 25,000 ft. this week). This venture is being drilled by company crews using a conventional gas-engine power rig (rated at around 18,000-19,000-ft. capacity).

• **Phillips and Sinclair Oil & Gas Co. No. 1-A Montgomery,** Pecos County. Phillips is the operator. Great Western Drilling Co., the contractor, is using its diesel-electric rig. The hole is currently bottomed at 23,400 ft., with operator fishing for tubing which parted during a test at 22,600-800 ft.

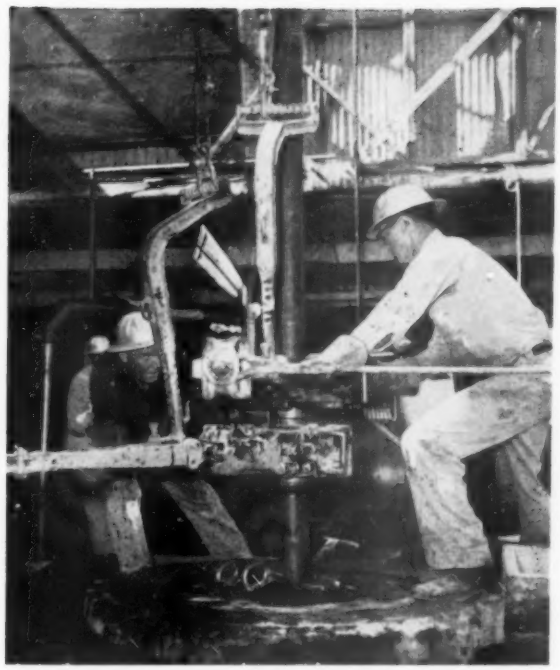
• **Phillips No. 1-A Harral,** also in Pecos County, was drilled to 19,020 ft. with a conventional diesel rig. A fish job was also in progress there last week, following parting of tubing during tests at 15,770-90 ft.

• **Shell Oil Co. No. 5 Rumberger,** Beckham County, Okla. This test is being drilled by Helmerich & Payne, Inc., with a big gas-engine rig. As of last week this test was bottomed at 23,518 ft. while operator fished for drill pipe that twisted off when coming out of the hole.

• **Howell & Howell et al No. 1 Anadarko Basin,** Caddo County, Okla. This test, projected to 24,000 ft., was drilling below 18,149 ft. last week.

Another deep, and significant, project is Ginther, Warren & Co. No. 1-A O. W. Killam, Webb County, Southwest Texas.

This venture is bottomed at 19,503 ft. and will not be taken any deeper. Operator is now testing through perfora-



IN 1953, fourbles were broken out this way when Ohio Oil Co. No. 72-4 KCL A set a world's depth record in California.

IN 1958, pipe was pulled this way on the Phillips-Sinclair No. 1-A Montgomery, which went to 23,400 ft. in West Texas.

tions at 11,232-96 ft. in the bottom Taylor sand. It was tested at lower depths, but "no encouraging sands were encountered," according to a company spokesman.

Unlike the other five deep tests, however, the Killam hole has been plagued with troubles, including a blowout at 14,000 ft. It was originally scheduled to go to the Edwards formation (PW—Sep.5'58,p19).

Phillips' three-test program in a relatively small triangular area of Pecos County, West Texas, is a good example of how planning and technical ability can result in successful drilling of superdeep holes.

One such undertaking to 20,000 ft. would have been noteworthy in itself. But Phillips (with Sinclair on one test) decided to drill two holes below 20,000 ft. and one below 19,000 ft. to test the geology of the general area near Ft. Stockton.

The No. 1-EE University is 13 mi. east of Ft. Stockton. The No. 1-A Montgomery is 13 mi. southwest of No. 1-EE, and the No. 1-A Harral is 9 mi. southeast of the No. 1-EE and 14 mi. northeast of the No. 1-A Montgomery. All are in the Sheffield Channel of the Permian Basin (PW—Oct.25'57,p28).

Pan American Petroleum Corp. No. 1-CS University, which was drilled to 21,687 ft. and abandoned late last year, was only a few miles southeast of the No. 1-A Harral, making Pecos County the undisputed focal point of deep-drilling activity.

While Phillips did expect to gain some valuable information about the geology in its triangular deep-test area, it had no original intentions to go as deep as it has.

Depth schedules have been pushed forward several times on the three tests as drilling progressed. The No. 1-EE, for instance, was originally programmed to go to 18,500 ft. This was amended to 21,000 ft., to 23,000 ft., to 25,000 ft., and—only last week—to 25,500 ft.

The No. 1-EE was aimed for the Ellenburger (Ordovician), which was found several times (the first top being at 16,708 ft.) indicating that the test was drilling through a series of complex overthrust faults and overturned folds. The 25-000-ft. target was set in the belief that the main "in place" Ellenburger would be found somewhere between 24,000 and 25,000 ft.

The top of the "in place" Ellenburger was actually reached at 24,974 ft.

When operator reached 25,000 ft. last week, the special high-tensile drill pipe was pulled and examined. If it appeared satisfactory, as expected, drilling was scheduled to be resumed.

The No. 1-A Montgomery also was aimed for the Ellenburger. This test ran high structurally in comparison to the No. 1-EE, and the Ellenburger objective was topped at 22,598 ft. The hole was carried on down to 23,400 ft. then plugged back to 22,940 ft. for tests of higher sections of the Ellenburger.

The No. 1-A Harral was scheduled as a Pennsylvanian test, "and was not intended to go as deep as the other two," according to a Phillips spokesman.

No cost figures have been released by Phillips. But assuming a cost of $2.5-million for a 20,000-ft. test, on the basis of other holes drilled to that depth, Phillips

continued ▸

NO. 5 RUMBERGER became the world's second-deepest hole last week. This is a closeup of Helmerich & Payne's Rig No. 47.

COTTON-PICKING WORKERS form a scenic foreground to the No. 5 Rumberger, in Oklahoma's Elk City field.

(and Sinclair) have invested about $7-million, or more, in the three deep tests.

Because it has crashed the 25-000-ft. barrier with ease in setting a new world's depth record, Phillips No. 1-EE University has attracted the most industry attention.

The biggest difficulty in more than two years of drilling was a fishing job at 21,396 ft., when a 17,600 ft. string of 4½-in. drill pipe fell into the hole (PW—Jun.6'58, p21).

Part of this string was recovered, but 39 joints had to be left in the hole. A whipstocked hole—the world's deepest—was started at 19,965 ft., and drilling continued without further setbacks.

Casing and cementing went off without a hitch. High-viscosity "Driscose" (GMC) oil-emulsion muds have been used nearly all the way, with satisfactory results.

Phillips had tested the Ellenburger at 17,190-331 ft. and recovered a gas-cut water blanket and heavily gas-cut mud.

Phillips and Sinclair's No. 1-A Montgomery, now bottomed at 23,400 ft., has been called "a trouble-free hole if there ever was one."

A big feature of this test is the special diesel-electric rig assembled for the operation. Great Western Drilling Co. Rig No. 44 is unique in that it was designed and built as an all-electric rig, in which the electric motors are integral with the drawworks, pumps, and rotary table (PW—Jul.19'57,p24).

Only two fishing jobs and some "relatively minor" lost-circulation problems have been encountered in drilling to total depth. The fish jobs occurred when the 4½-in. drill pipe parted (PW—Jul.25'58,p6). But pipe was grabbed easily and pulled out of the hole without difficulty. (Last week, however, operator ran into another fish job when tubing pulled apart during a test at 22,600-800 ft. The crew was attempting to recover all tubing before resuming tests.)

The No. 1-A Montgomery also has had the world's deepest single-stage squeeze-cement job, at 23,000-400 ft., using special cement additives.

A spokesman for Drilling Specialties Co., a Phillips subsidiary and developer of the Diacel system, reports: "The Halliburton crews used 16 lb. per gal. cement slurry of 'Trinity Inferno' hot slow-set cement.

"The 150 cu. ft. of slurry consisted of 79 sacks of Inferno, 4,740 lb. of barite, and 126 lb. of Diacel LWL (1.7% by weight of cement). Thickening time of this tailor-blended slurry was five hours plus. Highest temperature recorded was 475F."

The Diacel cement systems used on the Montgomery are a group of cement additives designed for low-water-loss, retarder, and low-density cements.

Phillips No. 1-A Harral has taken somewhat of a back seat to its deeper neighbors. Yet this 19,020-ft. hole was drilled with equally noteworthy ease.

It is significant to note that a 2,000-hp. rig was used on this test, while a rig with a rating of only 1,750 hp. was used on the No. 1-EE, which has gone 6,000 ft. deeper.

"Horsepower is not too important," says a Phillips engineer. "If a rig can stand the weight and can accom-

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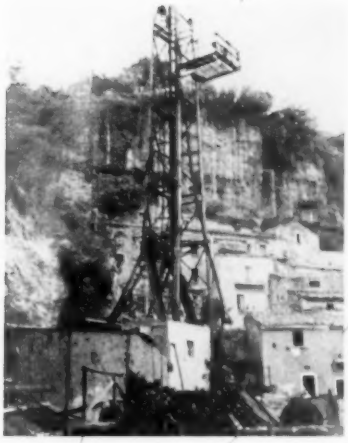
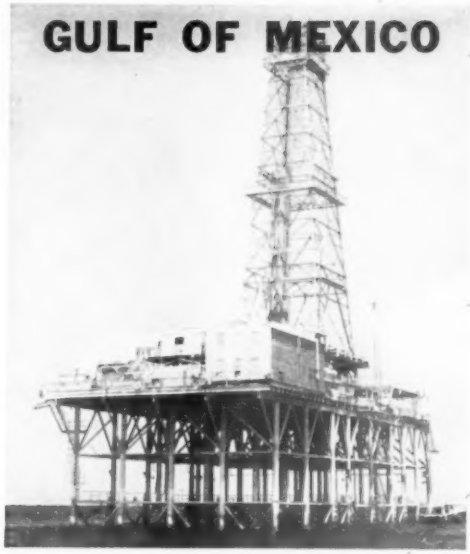


GULF OF MEXICO



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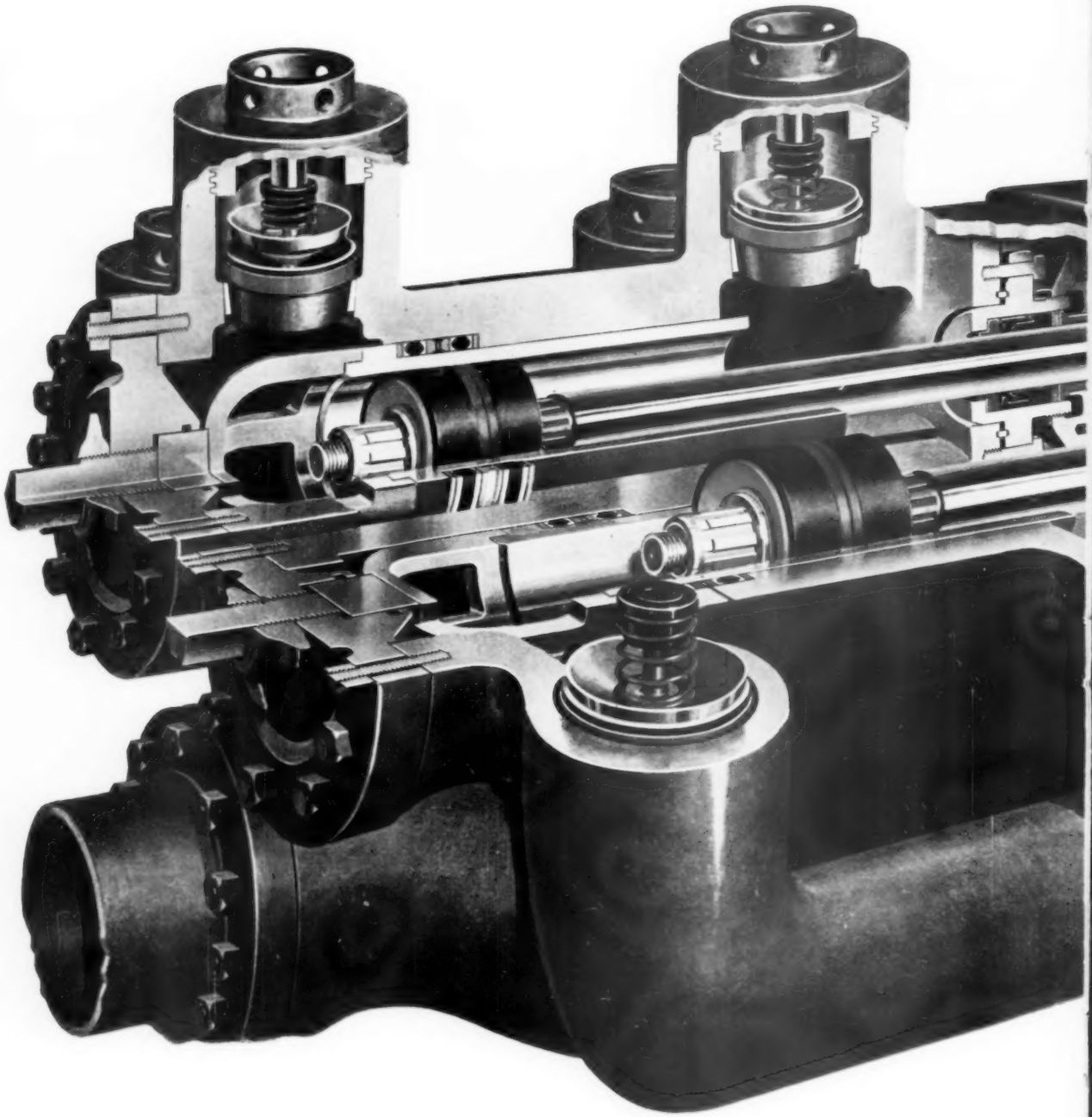

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# of Your Rig ..... by MISSION

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WE MADE THIS cutaway view of a mud pump so you can see just where the vital fluid-end parts fit and why they are essential to correct operation. Your mud pump is one of the hardest working parts of your rig. Forces on these fluid-end parts are staggering. For example, pistons and rods may be subjected to forces of more than 100,000 pounds. These forces may be multiplied by shock loading at times, and they are completely reversed at least once every second. When you remember that mud may contain abrasive sand to cut metal parts, corrosive chemicals to pit them, and oil to attack rubber, it seems obvious that only the best pump parts stand a chance.

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PISTON RODS AND GLAND PACKING depend on each other for satisfactory service. From an economic standpoint, *MISSION SUPER-CHROME PISTON RODS* and *MISSION SELF-SEALING GLAND PACKING* make an unbeatable combination. The pressure-seal feature of the packing extends rod life while the non-pitting chrome surface of the rods extend packing life.

Now look at Valve Seats. The correct size, taper and surface finish of the seat can prevent costly pump deck washouts. Mission employs some of the most modern manufacturing and quality control techniques to assure perfect tapers.

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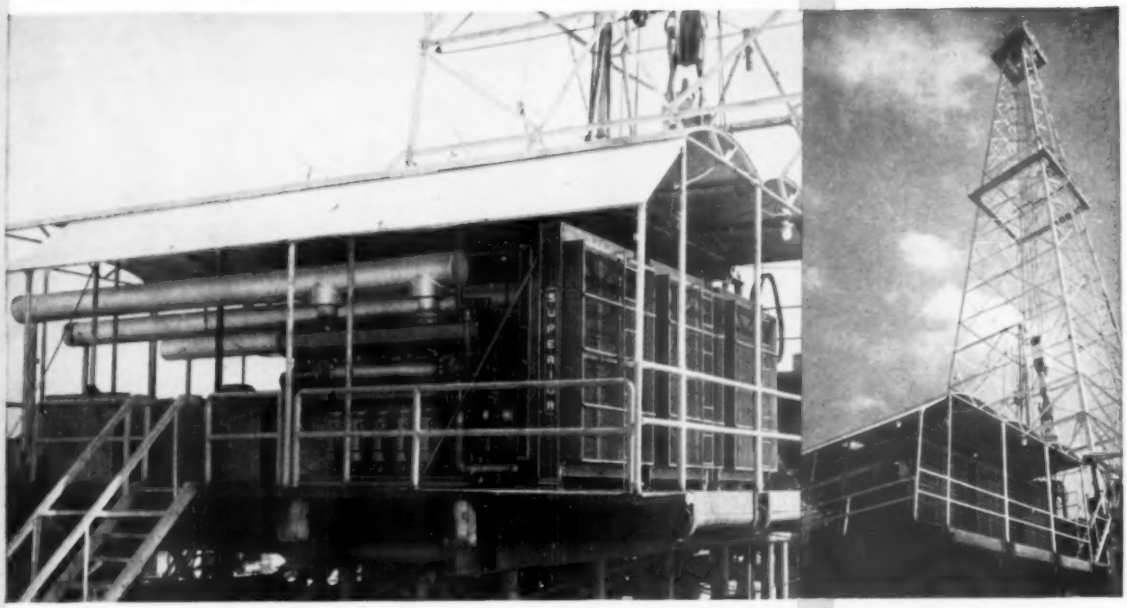

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NO. 1-A MONTGOMERY. Pecos County, West Texas, was drilled by Great Western Drilling Co. with this all-electric rig.

NO. 1-EE UNIVERSITY, also in Pecos County, was drilled by Phillips below the historic 25,000-ft. level last week.

modate the lines, then power is not a major factor. We had this more powerful rig available, so we used it on the Harral. We felt our 1,750-hp. rig could do the job on the 1-EE, and it has."

Shell's No. 5 Rumberger has just taken over as the world's second-deepest hole, reaching 23,518 ft. last week. At this depth, drill pipe twisted off while the crew was pulling pipe to change bits. Operator was running an overshot in an attempt to recover 8,800 ft. of stuck pipe.

This deep geological test in the center of Oklahoma's Elk City field, Beckham County, also holds claim to being the straightest deep hole ever drilled, veering only 170 ft. off vertical to a depth of more than 20,000 ft. "This is one factor that has contributed to lack of hole trouble, sloughing, or caving," says a spokesman for Helmerich & Payne, contractor on the job (PW—May30'58,p22).

The No. 5 Rumberger broke Oklahoma's old depth record when it passed the 20,426-ft. mark set by Magnolia Petroleum Co. No. 1 Sterba-Ordovician, a Caddo County dry hole.

Shell, which is aiming for Springer sand production, recently extended the contract depth from 21,000 ft. to 24,000 ft.

An interesting aspect of this test has been the use of a Dresser Industries turbodrill on part of the run (PW—May30'58,p22). The turbodrill was used because of the tremendous horsepower available to the pumps, "making this an ideal rig for such tests," according to an H&P spokesman.

Diamond bits have been used since 7-in. casing was landed at 20,505 ft. These bits, costing about $3,500, underscore the expenses involved in such superdeep operations. Conversion from water- to oil-base mud cost an additional $20,000.

The fifth significant deep test gaining the attention of the drilling industry is Howell & Howell et al No. 1 Anadarko Basin, Caddo County, Okla. Projected to 24,000 ft. to test the Bromide, this test is now drilling below 18,149 ft.

Tekoil Corp., Gulf Oil Corp., and Kenneth A. Ellison and Associates are working-interest partners in the venture, located on the Ft. Cobb anticline (PW—Aug.1'58,p26).

Some trouble was encountered when 9⅝-in. liner was cemented at 17,447 ft. After drilling ahead to 17,732 ft., the operator found that a hole had developed in the pipe. Another string was set into and over the 9⅝-in. liner, back almost to the surface.

The main source of trouble in this hole, according to reports, has been the gas encountered in the lower Morrow and Springer sands (Pennsylvanian). This gas has cut the mud weight, leading to considerable mud conditioning and slower round trips.

The test is said to be running somewhat higher than anticipated, and may not have to go all the way to 24,000 ft. to find the Bromide.

Included in the records set by this hole are 7,903 ft. of 17½-in. hole, and a 7,898-ft. string of 13⅜-in. casing. The 13⅜-in. casing is of a specially-made type, weighing 85 lb. per ft., compared with the usual 72-lb. API standard pipe.

continued ▸

SPECIAL REPORT
DRILLING

DERRICKMAN forms a sharp contrast to giant equipment on a typical deep-drilling rig in Texas. (Photo by Paul Dorsey.)

Other Deep Tests Are Important, Too

These tests may not go as deep as the "Big 5," but they are breaking regional records. Canada, too, has a new depth-record in the making.

Deep drilling also is making significant advances in other states, and in Canada.

There is a difference of opinion as to what constitutes a deep well in some states. Operating conditions, geology, and other factors have a bearing on this point. As has already been pointed out, a 10,000-ft. test in one area can pose many more problems than a 20,000-ft. test in another area.

In many states, too, there has been no pressing need to drill deeply, because oil and gas reserves have been found at shallow depths. Now, however, with many of these shallow fields depleted, or nearly so, a hunt for possible deeper pays is warranted.

PETROLEUM WEEK correspondents have taken a look at deep drilling, its problems, and some of the trends in such operations in their areas. Here is what they found:

California has been a real proving ground for deep tests. So far, more than 120 holes have been drilled below 14,000 ft.

About 90 of these have been drilled in the coastal region, 29 in the San Joaquin Valley, two in the Sacramento Valley, and two in the Los Angeles Basin.

California was the site of the world's deepest drilling operation a few years ago. Ohio Oil Co.'s No. 72-4 KCL A, in Paloma field, Kern County, was abandoned at 21,482 ft. December, 1954.

Another deep test that set records while drilling (1949) was Superior Oil Co. No. 1 Limoneira, in Montalvo North field, Ventura County. This test was abandoned at 18,734 ft.

Other deep holes that have been drilled in California in recent years include:

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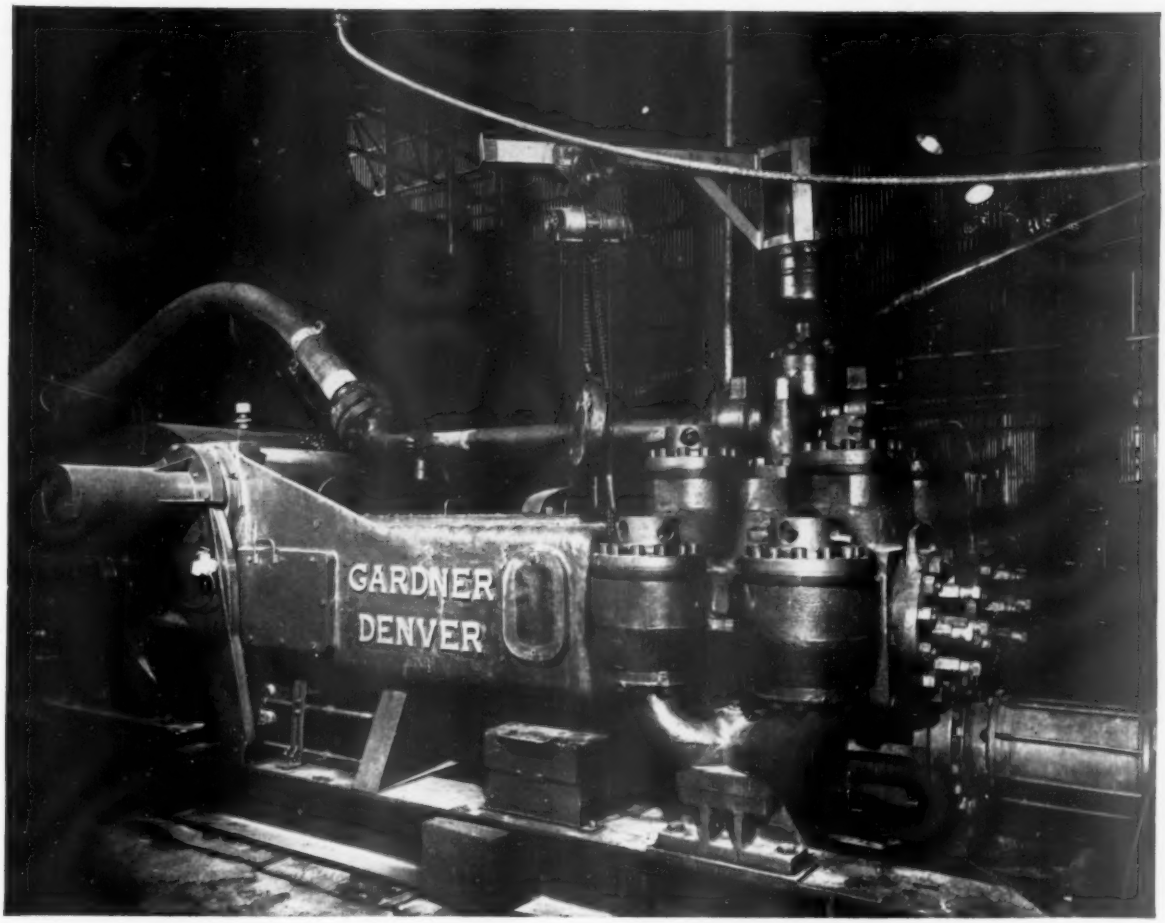

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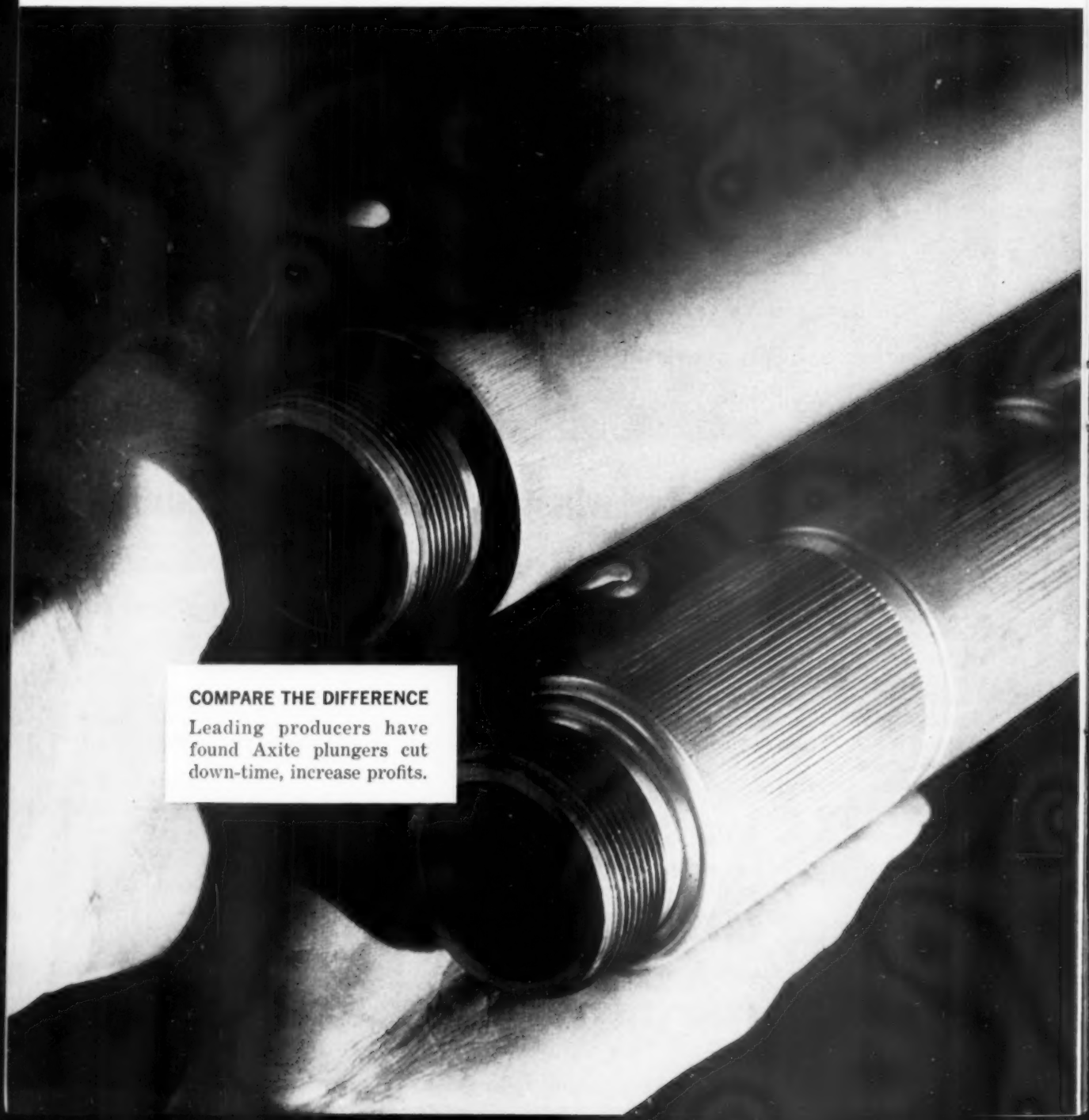

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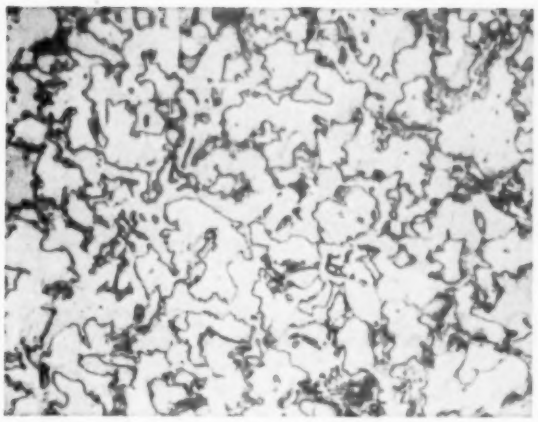
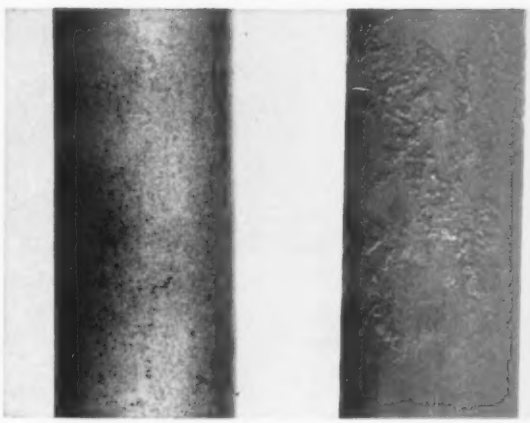


DIAMONDS have a hardness of 10 on the Mohs scale. The new Axite plunger has a hardness of 9. Detail above (magnified 500 times) shows a completely integrated metal surface. Carbide and boride particles—dispersed throughout the alloy—are four times harder than Rockwell "C" 62 reading indicates.



HIGH SURFACE RESISTANCE to corrosion is demonstrated in this comparative photo. After seven days of submersion in a concentrated hydrogen sulfide solution, Axite plunger remains clean and smooth while plunger made of other material shows deep pitting. When I. D. and pin face are nickel-plated, the Axite plunger is virtually impervious to all forms of corrosion.

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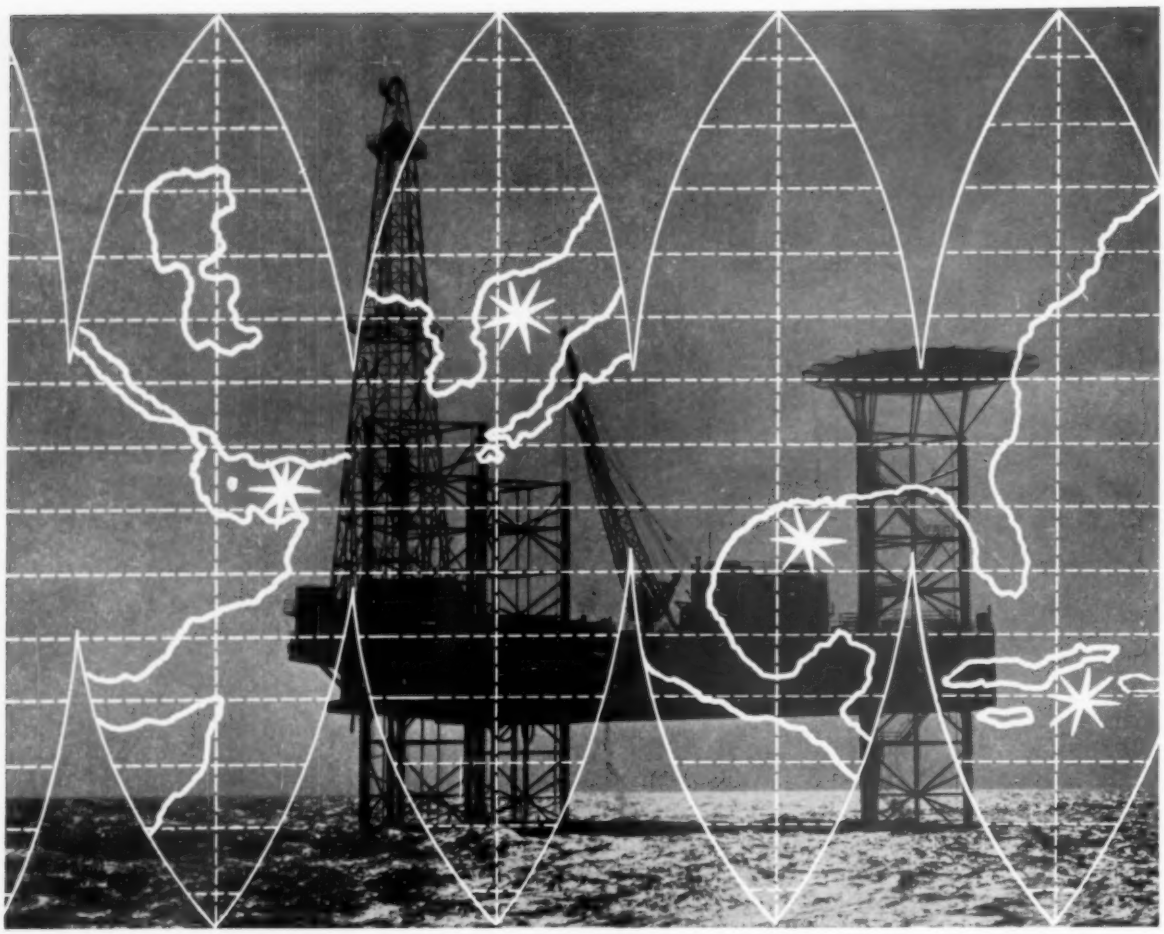

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• Richfield Oil Corp. No. 67-29 CLA, in North Coles Levee field, Kern County. This well reached total depth of 17,895 ft., and was completed in 1953 through perforations at 17,497-892 ft. in the Eocene sand, making it the world's deepest producer at that time. But the pay soon proved to be noncommercial, and the company plugged the well back to the Stevens sand (Miocene) at around 11,000 ft. for recompletion.

• Standard Oil Co. of California No. 1 Maxwell, in Montalvo field, Ventura County, was abandoned at 17,696 ft. in 1948.

• The Texas Co. No. 1 Lawton, in Fairview Canyon field, Ventura County, was abandoned last year at 17,485 ft.

• Standard Oil Co. of California No. 12-12 McGrath-4, in West Montalvo field, Ventura County, went to 17,422 ft. last year. It was plugged back for completion at 12,385-720 ft. for 31 b/d of 21-gravity oil and 65,000 cu. ft. of gas a day through ½-in. choke.

Several important deep tests are currently being drilled in California. Among them:

• Tidewater Oil Co. No. 185 Lloyd, Ventura Avenue field, is scheduled to 17,000 ft. Crews cemented 7-in. casing at 15,074 ft. several weeks ago, and testing is under way.

• Lloyd Corp., Ltd., No. 6 W.S., in the same field, is now being redrilled below 9,318 ft. It originally had been bottomed at 14,360 ft.

• Superior's No. 58-21 CWOD, in Midway-Sunset field, San Joaquin Valley, is bottomed at 14,504 ft.

• Humble Oil's No. 1 Ernest W. Michael, in the Orland area, Glenn County, is slated for 15,000 ft., in search of oil in a predominantly gas area. It was at 13,699 ft. at last report.

A projected 18,000-20,000-ft. test in Newhall-Portrero field, Los Angeles County, has been deferred by Sunray Mid-Continent Oil Co. because of the depressed oil situation. A company spokesman in California says the test has been set back at least a year.

Possibly the most significant deep find in the state in recent years has been Fillmore field, opened in April, 1954, by Standard Oil Co. of California No. 1 Sespe Ranch. It was completed for 509 b/d of 27.2-gravity oil through perforations at 14,170-235 ft. in the Pinco formation (Pliocene).

The field today has about 40 wells, with production of around 8,000 b/d of oil and 16.8-mililon cu. ft. of gas daily.

The drilling of Ohio Oil's 21,482-ft. Paloma test several years ago offers an interesting comparison with some of today's very deep tests.

The Ohio test took more than three years of operational time, having been spudded on Oct. 23, 1951, and abandoned on Dec. 31, 1954.

The Phillips No. 1-EE University, in contrast, has been drilled to the 25,000-ft. mark in considerably less than two years.

The Ohio test cost $2.2-million, of which $1.9-million was paid by Ohio, and the remainder by Hancock Oil Co., General Petroleum Corp., Pacific Western Oil Co. (now Getty Oil Co.), Lloyd Corp., Western Oil Co., and The Texas Co.

CANADA'S DEEPEST HOLE was drilled with this weather-protected rig, now being used on a test that's to go even deeper.

Temperatures below 20,000 ft. ranged up to 330F. Special oil-base drilling fluids had to be used below 11,000 ft. because the conventional water-clay fluids would have balled and hardened.

From 10,947 ft. to bottom, diamond bits and coreheads were used. Average penetration rates varied from 1.1 ft. per hour for the diamond bits to 1.2 ft. per hour for diamond coreheads.

Ohio, however, ran into one stroke of bad luck which Phillips hasn't had to face in Pecos County. An earthquake occurred in 1952 while the crew was drilling at 14,310 ft. The top of the 194-ft. derrick swayed in an arc of 15 to 20 ft., and the drilling lines supporting the block, hook, and drill pipe slapped the sides of the derrick. Mud splashed out over the top of the mud ditch. The driller chained the brake, and, as a result, the damage was limited to a dislocation of some of the lines serving the rig.

Several important deep tests have been drilled in the

continued ▸

Louisiana-Texas coastal areas, including the world's deepest producer in Plaquemines Parish, La.

Here is a rundown on some of the deepest holes in the region, either drilled or drilling.

- Richardson & Bass-John Mecom-Freeport Sulphur No. 1-L Humble-L.L.&E., in Plaquemines Parish, is the world's deepest producer at 20,741-45 ft. (Original producing depth had been 21,419-65 ft.) The well had held the depth record of 22,750 ft. until Phillips smashed this mark with the No. 1-EE University.
- John Mecom et al No. 2-K L.L.&E., Plaquemines Parish, now drilling below 18,522 ft. This test flowed 308 b/d through 1/64-in. choke during a recent 12-hour test.
- John Mecom et al No. 1-Q L.L.&E., Plaquemines Parish, drilling below 14,000 ft. toward projected depth of 18,500-19,000 ft.
- Magnolia Petroleum Co. No. 414-A West Branch, Jackson County, Southwest Texas, was drilled to 19,060 ft. but completed as a shallower well.
- Ginther, Warren & Co. No. 1-A O. W. Killam, Webb County, Southwest Texas, bottomed at 19,503 ft. Other details of this test have already been discussed.
- Humble Oil & Refining Co. No. 1 Robertson McDonald Lumber Co., Moss Bluff field, Liberty County, Texas Gulf Coast, drilled to 18,074 ft. and abandoned.
- Shell Oil Co. No. 1 Antill, Humphries field, Terrebonne Parish, La., drilled to 19,000 ft., and subsequently completed at 10,621-26 ft.
- Magnolia No. 1-A State Lease 2726, Main Pass Area, off Louisiana, said to be the world's deepest offshore hole at 16,716 ft. This well was completed at 14,294-305 ft. and shut in.
- Tennessee Gas Transmission-Magnolia No. 2 Morgan Plantation, Jefferson Davis Parish, drilling below 16,435 ft.
- CATC Group No. 8-C State Lease 970, West Delta Block 30 field, Louisiana offshore, was drilled "only" to 12,947 ft., but this well has made history as the world's first quadruple completion (PW—Aug.1'58,p22).

One drilling engineer for a large operator in this area makes this claim: "We have never drilled any real deep tests on the Texas-Louisiana coast, but we anticipate drilling wells to 25,000 ft. or deeper in the next few years —possibly within five years."

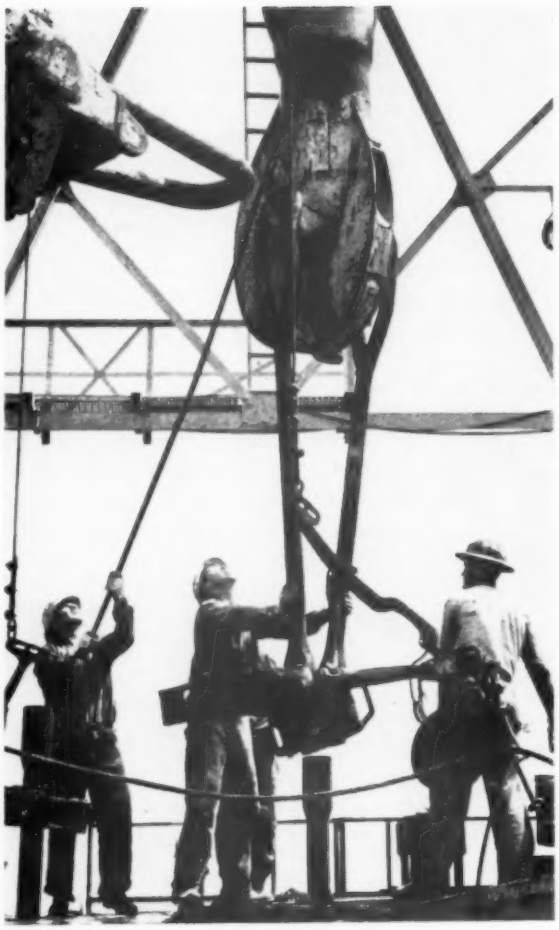
This engineer adds: "Field after field in South Louisiana is going to have to be evaluated soon. The economics of deep drilling is the only thing to consider. Any 25,000-ft. hole is going to cost between $2-million and $2.5-million. But some southern Louisiana gas wells drilled to 14,000-15,000 ft. are valued at more than $25-million.

"In anticipation of this deeper drilling, we are setting up various programs, using different types of muds and equipment. We are preparing our personnel to cope with the problems we expect to face. Louisiana will get the greatest play. It's all a matter of geology. A 2-ft. sand in Arkansas could well be a 200-ft. sand in Louisiana.

"On the Texas Gulf Coast, where sand development is more limited, the chance of a payout for a deep test is less likely. But in Louisiana you may find one massive gas sand worth upwards of $150-million."

Indications are that this company will drill its first superdeep test (below 25,000 ft.) in the Bastian Bay area of Louisiana.

A spokesman for John W. Mecom Co. says the firm won't consider drilling any more deep wells in the same Louisiana area as the No. 1-L Humble-L.L.&E., which went to 22,570 ft.



CREWMEN TURN THE HOOK, prior to picking up the kelly to resume drilling. (Photo by Paul Dorsey.)

While the world's deepest producer is not expected to pay out, it is believed worthwhile for its evaluation of the geology in the area.

As a result of its findings, the Mecom firm has accomplished two things: (1) It has learned a great deal about the drilling of deep wells and has used this knowledge in drilling other deep tests; and (2) it has learned that many of the sands encountered up-hole are potentially productive. The company is now seeking some of these sands in that area.

At least one other source believes several ventures with projected depths to 24,000 ft. will be started soon in the Gulf Coast area.

This source says these tests "will be drilled in order to obtain geologic information and profitable production."

He believes that equipment to be used in drilling these tests will be of "present-day design," but with bigger safety factors and greater efficiencies built into such equipment.

ROCK BIT is fitted onto the drill collar for another trip into the hole. (Photo by Paul Dorsey.)

"New equipment and new techniques for combatting loss of circulation in very deep wells—probably the biggest problem facing the deep drillers—will be improvised as the need arises."

According to another engineer, some of the major problems that will have to be faced in drilling very deep holes along the Gulf area will be lost circulation, high bottom-hole temperatures, high pressures, and contaminants to drilling fluids, such as massive salt, hydratable shales, salt water, and the like.

Another engineer notes: "One reason why you don't see more deep drilling in this area is that no one has ever proved that such deep drilling is economical."

This engineer says his company hasn't had part in any test that has gone to 18,000 ft. in the past 1½ years.

He adds that, in some deep Louisiana tests, operators are considering the addition of more drill collars to their drill strings "to step up the penetration rate." One procedure being tried, he says, is using large drill collars, which are still small enough, however, to permit fishing around them.

"There is a trend toward hand-applied drill joints for deep drilling," says an operator. "Something could happen anytime you add physical properties to steel by welding the joints and applying heat to the area."

Another skeptic about the need for drilling very deep wells (and there are many like him) says: "There's just no need to drill that deep. There is nothing on the horizon that would indicate companies need to know the geology at, let's say, 30,000 ft."

No new holes to 20,000 ft. are scheduled presently for West Texas, where Phillips is engaged in its epic three-hole program. But there have been several deep holes already drilled in this area by other operators.

Pan American Petroleum's No. 1-CS University, in Pecos County, had held the state depth record for only a few months before it was beaten by the Phillips No. 1-EE University. The No. 1-CS was abandoned at 21,687 ft.

Gulf's No. 1 P. G. Northrup, in Reeves County, was plugged at 18,600 ft.

Shell's No. 1-17-A University, in Winkler County, was drilled to 17,410 ft. and plugged.

Alabama oil men are probing deeply, but are stymied by inability to come up with solid geologic information.

This lack of information is particularly unusual because about three-quarters of the state's production comes from below 10,500 ft.

Seismic logs don't give good pictures, especially in the southwest part of the state, and seldom read the same even if shot in a certain area again and again, under similar conditions. So operators can only speculate as to what really lies deep, and most wildcatting is done on the basis of gravity anomalies.

One interesting deep test is Humble-Pure No. 1 Champion-Klepac et al, which was drilled to 15,350 ft. This test, 12 mi. south of the shallow South Carlton field, Clarke County, penetrated the Smackover and bottomed in a salt dome.

Trans-Tex Drilling Co. (now Rimrock-Tidelands, Inc.), the contractor, encountered difficulty in putting the hole through sharply-faulted formations. There were three fishing jobs and two deep sidetracked holes. Salt mud, which was used after pipe sheared off twice in the shale, crystallized the pipe.

But there are factors that make deep drilling an attractive proposition in Alabama. These include a 365-day-year allowable and modification of spacing laws from 40 acres up to a possible 160 acres for wells below 10,000 ft. (in areas outside present fields).

A Smackover test is said to be planned in the big Citronelle field after it is unitized. The Smackover is thought to be at around 15,000 ft. in this area.

Another big question mark in Alabama: What lies in the 30-mi.-long Mobile Bay offshore waters? Gulf drilled one 10,000-ft. and one 11,000-ft. test in the bay in 1952, but neither reached the Rodessa objective.

Several 20,000-ft. tests probably will be drilled in Oklahoma within the next few years, in addition to the two now being drilled.

One operator is planning to drill a deep test next year in the Cordell area, Washita County. It will probably be

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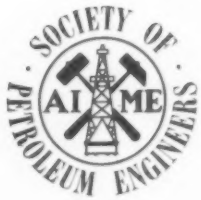

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"worried down" to 20,000 ft. But when it is announced, it will be slated "only for about 12,000 ft. to 14,000 ft."

A similarly deep hole is planned in McClain County, and a wildcat now drilling in Garvin County (Lone Star Gas Co. No. 1-A Bolling) is slated to go to 18,000 ft. Progress has been slow and, at last reports, the hole was down to 14,900 ft.

Some Oklahoma operators say that some very deep holes may have to be held up until a better price for oil can be realized, and proration schedules are eased.

Regardless of what comes, however, the state is likely to continue to be fertile ground for deep drilling activity. The state's current producing depth record is held by British-American Oil Producing Co. No. 1 Krieger, in Stephens County, which is making gas from the Oil Creek formation at 16,526-46 ft. This well was drilled to total depth of 17,484 ft.

"The type of reservoirs that we know about in the Rockies are not ones that would encourage really deep drilling," says a veteran Rockies oil man.

"You're going to have to get a better price for crude before deep drilling will ever pay off out here," he says.

"Some basins, like the Green River Basin in southwest Wyoming, and the Powder River and Big Horn Basins, also in that state, might justify wells as deep as 15,000 ft., he continues. "So far, in the Green River Basin, objectives have been gas horizons. I believe that you could drill there as deep as 30,000 ft. before finding any oil."

Only one test has been projected as deep as 14,500 ft., and it is in the Green River Basin. Signal Drilling & Exploration, Inc., is drilling this test for G. L. Rieser, a Chicago independent. The test, No. 1 Govt. Rieser, is ¾ mi. northwest of Superior Oil Co. No. 1 Pacific Creek Unit, Sublette County, which is the deepest hole ever drilled (1949) in the Rockies. It went to 20,521 ft. and was abandoned.

The Rieser test is scheduled to be drilled as an 11-in. hole to 9,000 ft., where 8⅝-in. casing will be set. It will be drilled to 14,500 ft. with 7⅞-in. bits. The operator plans to use air drilling after the first 9,000 ft., but will switch to aerated lime water if too much water is encountered.

At last report, the test was drilling below 4,500 ft.

Another "probably deep test" that is attracting attention in the Rockies is Carter Oil Co. No. 1 Meridian Ridge, 30 mi. north of Kemmerer, Wyo., in the Green River Basin. The test may be carried to 14,000 ft.

Though most of the known formations in the Rockies do not appear to lend themselves to deep drilling, there are some formations at very deep levels that haven't yet been tapped by deep drilling.

Utah, for instance, has some of the deepest sedimentary rocks of any area in the country. Yet the deepest hole ever drilled in that state—Equity Oil Co.'s venture in northern Grand County—was abandoned in 1950 at 13,767 ft.

Tertiary sediments in the big Uinta Basin of Utah may run to 15,000 ft. or deeper. And in the Wasatch Plateau area, in the northern end of the Paradox Basin, great thicknesses of Tertiary through pre-Cambrian beds are believed to be present.

Pure Oil's Mississippian discovery last year in the Big Flat area also has led to deeper drilling in Utah. It was completed for 319 b/d from 7,694-729 ft.

Shell's No. 1 North Springs Unit, in the San Raphael Swell area of Carbon County, reached the Mississippian at 12,737 ft. this year, making it the second-deepest hole ever drilled in the state.

One operator has this opinion:

"Altitude is a factor that creates a peculiar hazard for deep drilling here. High altitude complicates trucking problems, and requires superchargers for drilling engines. There is a big loss in horsepower at these higher altitudes."

Other deep-drilling problems that are faced in the Rockies include lost circulation, hard rock, intense winter cold, isolation of rig sites (which increases cost of well servicing and supplies), crooked holes, and lack of water. Contract rates for a 15,000-ft. hole may range from $1,100 to $1,300 a day, which means great expense during downtime on remote tests.

There are some factors in the deep driller's favor, however: There are no extremely high pressures to deal with, and thus no serious blowout problems.

In Canada, a new depth record appears to be near. A test in the Alberta foothills area, scheduled to go to 16,500 ft. to test the Woodbend, is within striking distance of the current depth record of 15,195 ft.

The test—Northern Foothills Agreement Group No. 8-28 Simonette River—is drilling below 14,560 ft. The present depth record was set last year by British American Oil Co., Ltd., et al No. 6-4 Lambert Creek, 1sd 6-4-51-21w5, west of Pembina, in Alberta. This venture was abandoned after tests at plugged-back depths of 12,000 ft. and 6,000 ft.

The current project by the NFA Group, which includes Texaco Exploration Co., Shell Oil of Canada, Ltd., British American, and Mobil Oil of Canada, Ltd., is 45 mi. west of the tremendous gas discovery made by British American and Shell Oil Co. of Canada, Ltd., below 12,000 ft. in the Berland River area (PW—Sep.19'58,p32).

Arrow Drilling Co., contractor on the Simonette test, is using the Continental Emsco J-1000-1250 rig that was used to drill the Lambert Creek hole. It is equipped with three 385-hp. LRDS Waukesha engines, a Gardner-Denver GP-GXP 16-in. pump, and a Gardner-Denver FXQ 7¾-in. x 16-in. standby pump. The Lee C. Moore derrick has a capacity of 860,000 lb.

The drill string for this possible record-breaker is made up of 4½-in., 16.60-lb. drill pipe, of which 10,000 ft. is Grade E and 6,500 ft. is X-95, used above the Grade E. The 21 drill collars are 6¾-in. OD x 2⅞-in.

Operators are expecting an era of still deeper drilling to open soon in Western Canada, where the entire sedimentary section of the pre-Cambrian has been penetrated by relatively few drilling operations.

Most of this deep drilling is expected to be concentrated in the Alberta foothills belt. Some operators say holes to 20,000 ft. can be expected to be drilled here within the next few years.

Such ventures to 20,000 ft. would alter the present concept of what constitutes a deep well in Canada today.

Right now, any hole below 9,000 ft. in Canada is considered deep.

Most of the oil found to date in the foothills region comes from Mississippian rocks. One operator says: "We can see enough structures apparent from surface geology alone to keep the industry busy wildcatting through 1961."

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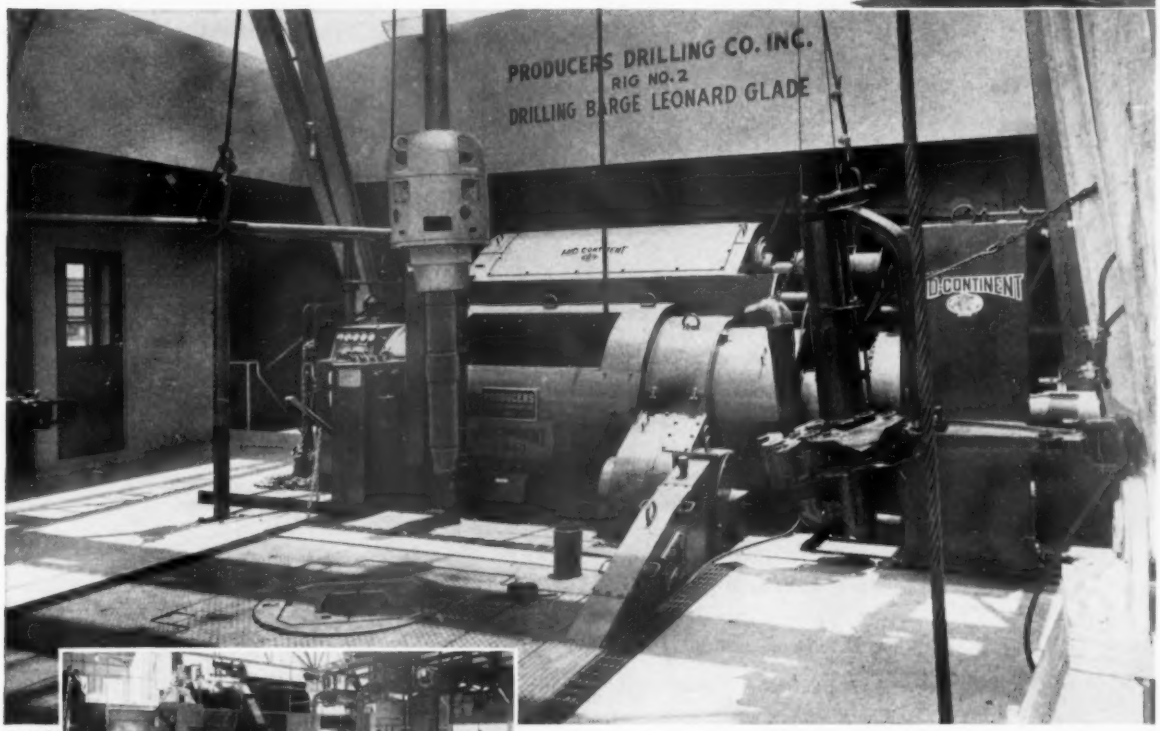
MID-CONTINENT U-914 DRAWWORKS SELECTED FOR "LEONARD GLADE"



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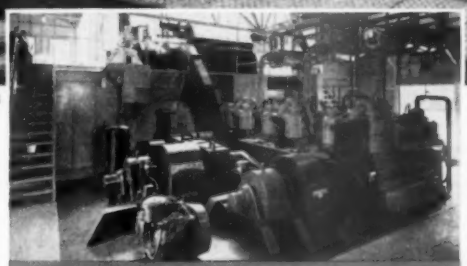
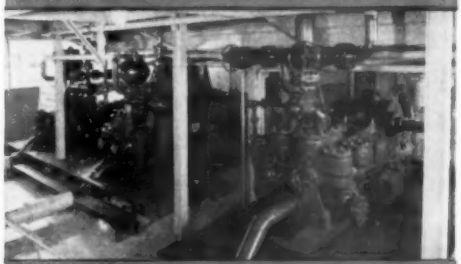


Mid-Continent S-612-A Swinging Compound* on the *Leonard Glade*.



Main slush pumps on the *Leonard Glade* are an Emsco D-1000 and D-700.

Producers Drilling Co., Inc. of New Orleans has selected Mid-Continent's 1400 horsepower U-914 drawworks for their recently-completed drilling barge *Leonard Glade*. This is the second barge-mounted rig completely equipped by Mid-Continent for Producers. The first barge, the *W. F. Youngblood*, was launched in 1957.

Major items of drilling equipment provided by Mid-Continent for the *Leonard Glade* include the drawworks, a Mid-Continent S-27½-A rotary table, a Mid-Continent S-162-A Swinging Compound* rig drive, Emsco D-1000 and D-700 slush pumps, a 14" unitized mud-mixing pump, and a Lee C. Moore cantilever-type mast.

For information about any item of drilling equipment or machinery, contact your Mid-Continent representative.

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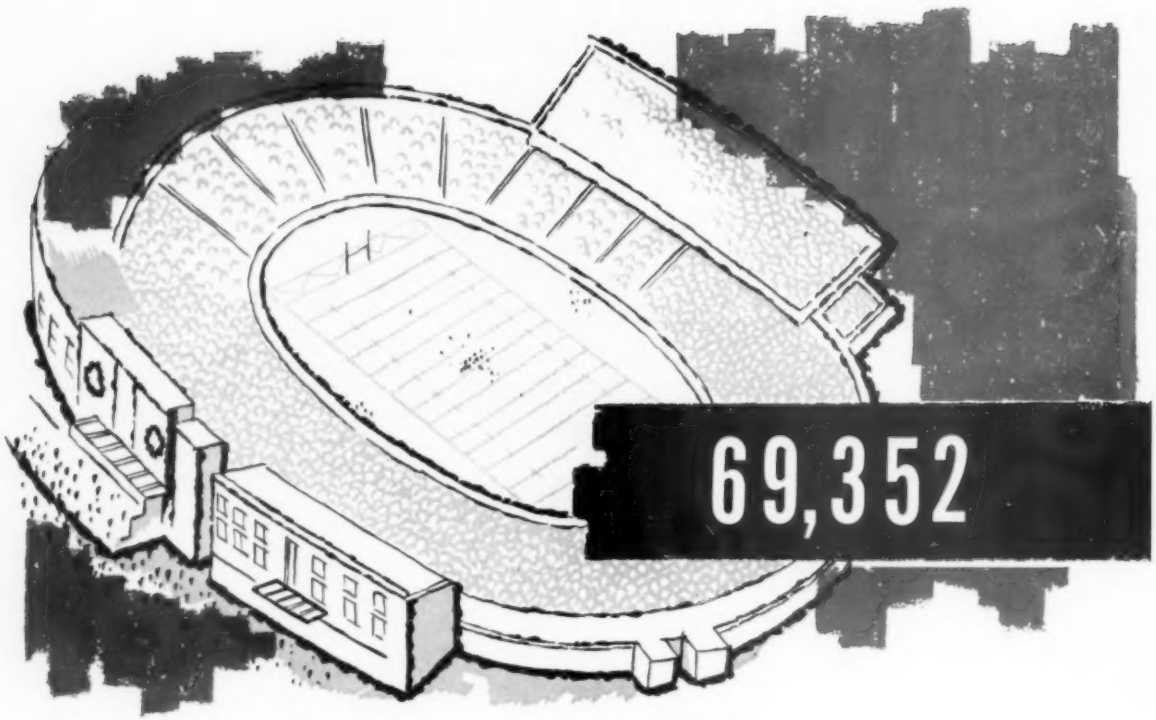

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DIAMOND BIT was used on the Ohio deep test in California. There's a strong trend to more use of such bits in deep holes.

J. C. DONNELL II, president of Ohio Oil Co., inspects a core from Ohio's California test, world's deepest in 1953.

Other Trends Mark Drilling Today

The diesel-electric rig is gaining in favor; the turbodrill is making progress; slim holes have their advocates; and diamond-bit use is increasing.

While deep drilling has taken a lion's share of the industry's attention this year, other important trends and developments are not being overlooked.

There is an interrelationship, of course, between many of the new developments and deep drilling. New mud and cement additives, diesel-electric rigs, diamond bits, and others, which have made deep drilling possible, also have application in shallow and intermediate drilling.

The diesel-electric rig seems to be gaining favor with contractors because of its proved ability to make hole quickly, and its easy portability.

Contractors say they like the extreme flexibility of such rigs. This factor leads to big savings in rigging up, tearing down, and moving to new sites. With "packaged" units, contractors can haul easily, without worrying about weight limitations on roads. One contractor puts it this way: "It's a lot simpler to pull a plug out of an electric socket when you want to move than it is to dismantle completely."

The market seems good, in the long run, for diesel-electric power packages. But right now, most contractors are hard-pressed for business. So, say most of them, they'll have to wait until economic conditions improve before they buy any new rigs. Others say that their present rigs, while old, bulky, and harder to move, have performed well, "so why change?"

Use of air/gas drilling hasn't increased as much as many engineers thought it would. But there are some who maintain that the technique, despite its problems and limitations, will continue to grow.

A leading company, which has done much research on this method of drilling, reports:

"Air drilling isn't increasing as much as we thought it would. But it hasn't entered into any decline either. We look for a slow, steady increase over the years."

The method is particularly suited to certain areas, such as the Rockies and West Texas, where water-bearing formations pose no real problem. Though air drilling makes up only a small percentage of all drilling, some experts believe that anywhere from 10% to 15% of all wells will be air-drilled in a few years.

Many of the early hazards associated with air/gas have

continued ▸

been minimized by self-contained compressor systems especially designed for such drilling. Other design improvements, including better bits, also have contributed to advances in this field.

The biggest problem remains, however, though progress is being made. This problem is water intrusion, which halts more air and gas drilling jobs than any other condition.

One method that seems to be effective in many cases involves the use of foaming agents, which turn the intruded water into an aerated foam in which cuttings are dispersed and suspended. The cost of these agents, however, limits application. Corrosion also becomes a problem. On the other hand, some foaming agents can control water flows of up to 50 bbl. per hour, or more.

Slim-hole drilling for shallow and medium-depth holes is likely to increase.

The method has not proved feasible, however, for deep drilling. If an operator reaches target depth in a slim hole and then decides to drill deeper, he has to ream out or redrill in order to accommodate larger casing. "If he has to do that," says an engineer, "it would cost him more than it would have cost to drill with regular-sized pipe in the first place."

Because of such limitations of slim holes, complicated by the problem of crooked holes, the slim-hole technique apparently will not see much use in deep drilling in the future, most contractors agree.

But real savings at shallow and intermediate depths will continue to make the method attractive.

The turbodrill, according to one operator, "has a definite place in deep drilling, and will make an important contribution to the drilling of many wells."

Shell's No. 5 Rumberger deep test in Beckham County, Okla., used the Dresser turbodrill part of the way (PW—Oct.11'57,p44).

The Dresser turbodrill currently is being used on two Oklahoma tests. One is being used by Carter Oil Co. in the Wewoka district of Seminole County in the drilling of a 3,600-ft. Booch test. The other is being used by Pan American in southern Oklahoma, on a test slated to go to 10,500 ft.

Dresser's new-type turbodrill recently compiled an impressive drilling record in the Herscher Dome area of Kankakee County, Ill. (PW—Aug.1'58,p28). Record hole-time was reported for the eight gas-injection holes drilled.

Shell Oil of Canada also is using the Dresser turbodrill, on a test near Pincher Creek, Alberta. Reports say the run has been successful.

In addition to the turbodrill, advances are being made as research continues into other types of drilling methods, such as Gulf's hammer drill, the vibratory drill, and the sonic drill.

MUD ACID in a Halliburton hopper is used to condition hole for better cementing bond. (Photo by Paul Dorsey.)

Contractors apparently are turning more and more to the use of larger-diameter casing, and to diamond roller and core bits.

This trend is related somewhat to the trend toward deeper drilling. A Houston engineer notes, for instance, that "there is a trend toward use of 7⅝-in. casing at lower depths, where possible. The use of this size pipe, however, is a calculated risk, because the larger your pipe, the more the danger of its collapse."

Most deep-test casing programs now call for 20-in. conductor pipe, followed by 13⅜-in. surface pipe, 9⅝-in. intermediate string, and 7-in. or 5-in. liners.

Contractors also predict that diamond bits, despite their high cost, will be used more frequently in order to make more hole with fewer round trips.

These are just some of the developments that can be expected to have impact on the drilling segment of the oil industry. But there are many others, such as multiple completions, which also will affect the progress of the industry in the years ahead.

One thing is sure: No development will be overlooked if it can possibly contribute to efficiency in some way. The number of contractors who have gone out of business this past year underscores that fact.

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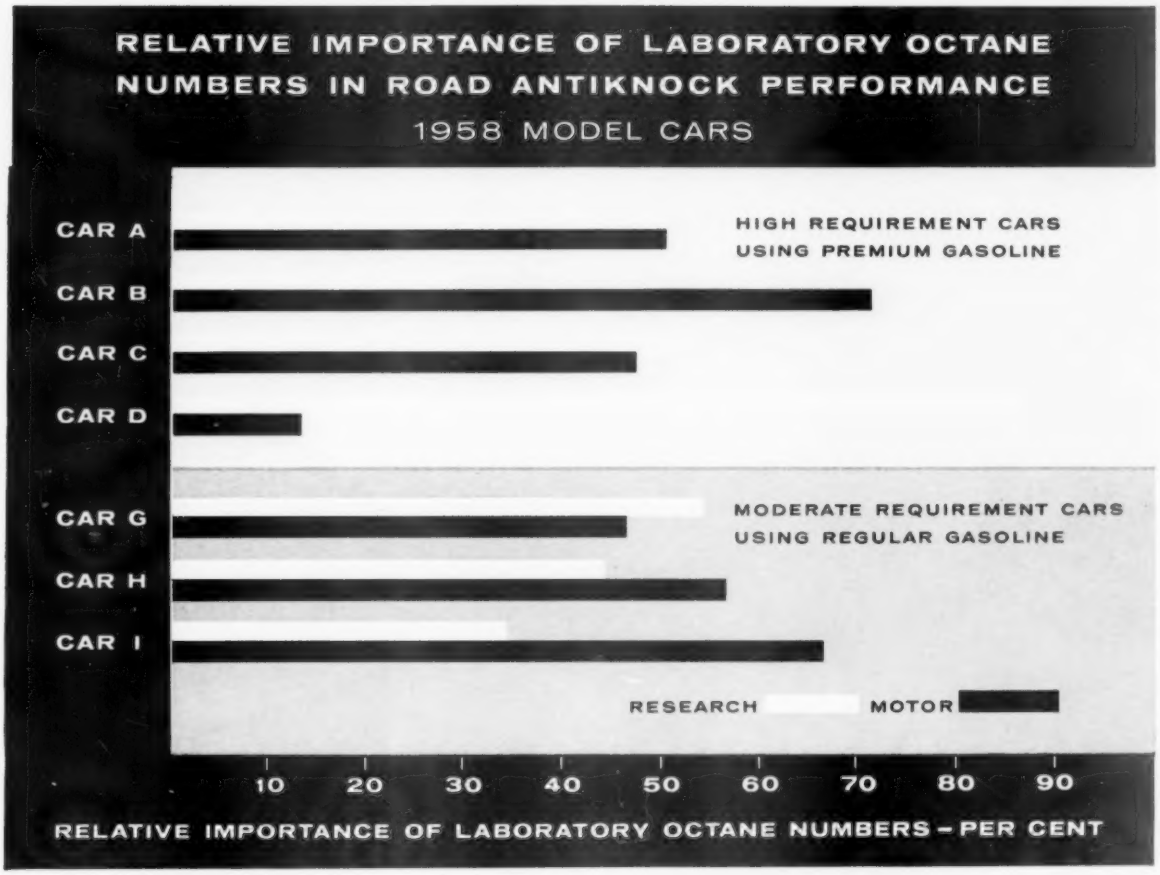

DuPont helps refiners predict road octane numbers from laboratory data

The antiknock quality of a gasoline is ultimately determined by its performance in the consumer's car. However, most gasoline antiknock specifications are based on laboratory octane tests which often do not indicate the true performance of a fuel in a car on the road.

Work at the DuPont Petroleum Laboratory has shown that the road antiknock performance of a gasoline can be estimated from a combination of the laboratory Research and Motor octane numbers. The correlations were developed with the aid of electronic computers and are available to refiners. Periodic revisions are made in the correlations to account for changes in engine design and fuel composition.

While the correlation equations generally can not be used as a direct substitute for road octane ratings, they do serve as a valuable guide to the refiner in blending motor fuel stocks to give best road antiknock performance at lowest cost.

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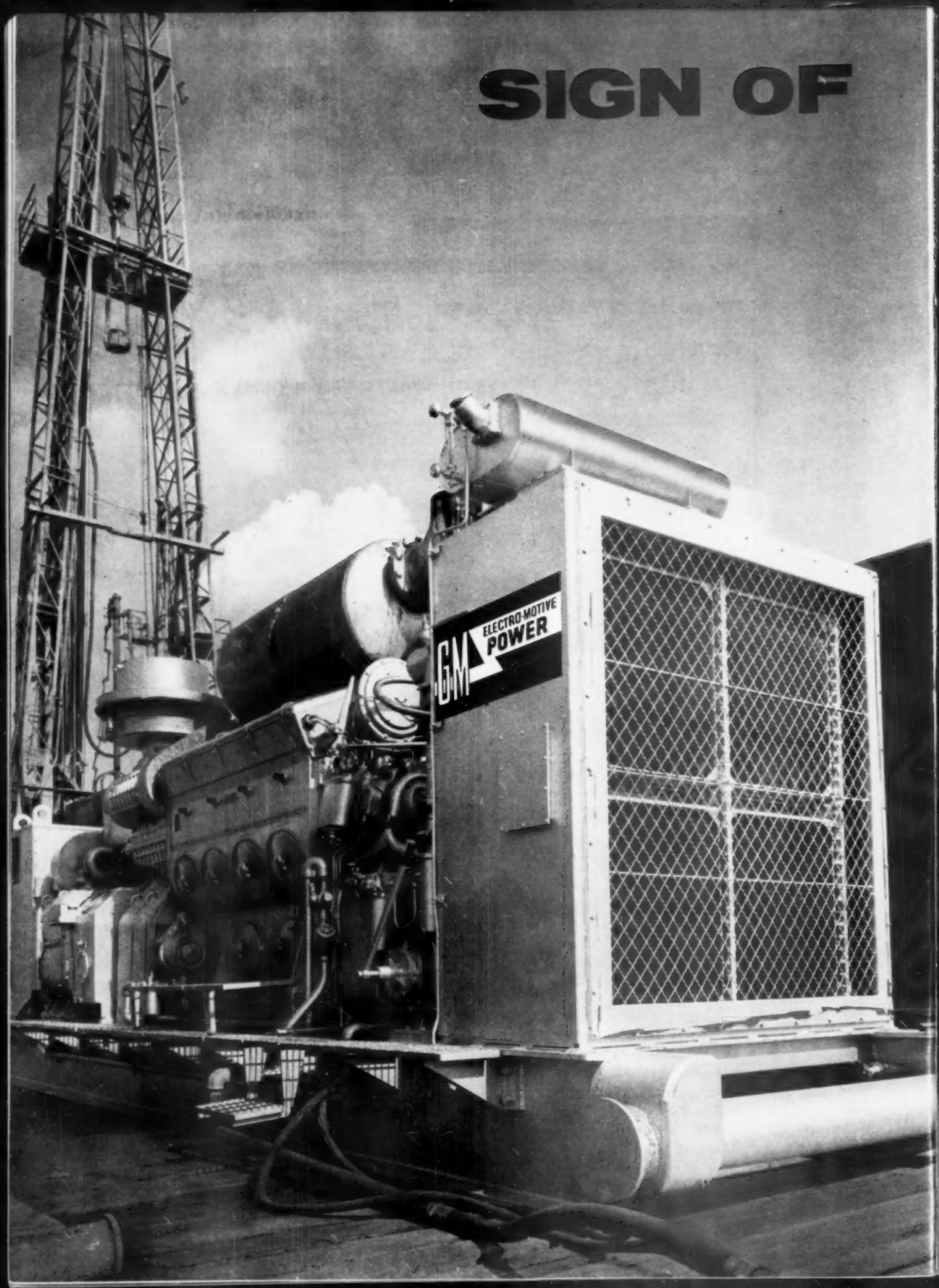
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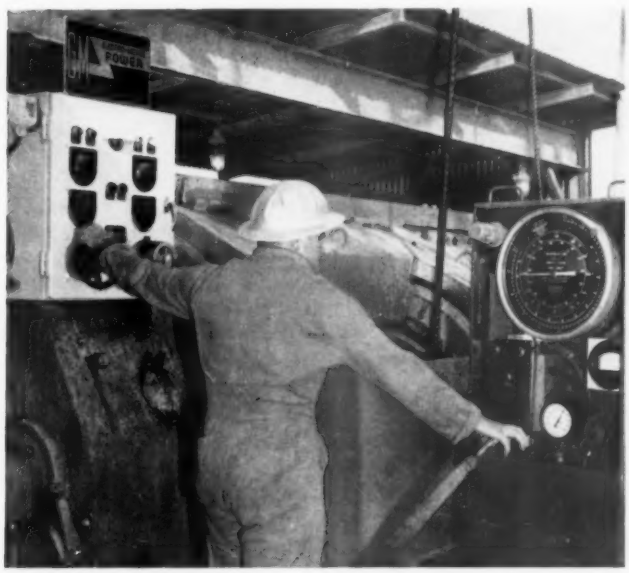

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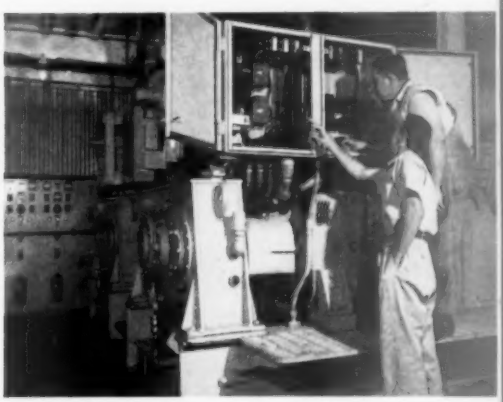

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New-Car Sales Should Pick Up in 1959

Stalled badly this year, America's auto industry will pick up speed again in 1959. Nothing like a record year is in sight. But a marked improvement seems almost certain. And rising car sales mean rising gasoline sales—the key to higher profits for the oil industry.

For car makers, 1958 has been the most painful peacetime year in a decade. New-car sales this year will total at most 4.8-million, including 300,000 foreign imports. This is well below the 1949-1957 average of 5.6-million. It's even worse compared with the really big years. About 6-million new cars were sold in 1956 and 1957—and over 7-million in 1955 (chart).

* * * *

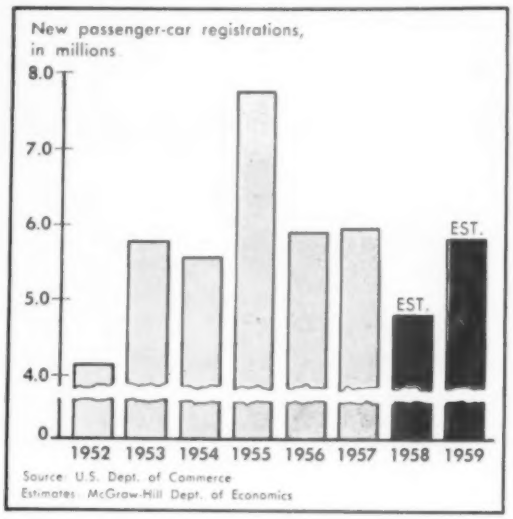
What went wrong in Detroit? The question has been debated endlessly—and bitterly—all year long. One argument puts the blame on styling. It says Americans are tired of overblown, chrome-laden, unparkable, ungarageable cars. The sharp increase in sales of small foreign cars lends support to this argument.

On the other side are those who put the blame on general business conditions—specifically, on the business recession. Here are the key points they make:

- Historically, new-car sales have proved very volatile. They shoot up more sharply than general business in boom times, plunge more steeply in downturns.
- Car sales this year have fallen most where unemployment has been worst. In some areas where unemployment has been mild, car sales have actually risen.
- Though total personal income held up well during the recession, this was due largely to increases in unemployment compensation and other recession benefits. Wage and salary payments—the real spending money—were falling the first part of the year. And prices for food and essential services were rising. So people had less extra money for expensive, readily postponable purchases like new cars.
- Recession-induced jitters kept consumers out of the new-car market. About ⅔ of all new cars are bought on credit. So, with unemployment high and consumer confidence low, American families shied away from assuming the heavy, long-term debt obligations involved in most new-car purchases.

* * * *

Nobody knows for sure who's right and who's wrong in the great debate on why the 1958 models flopped. If unpopular styling was the major cause, then 1959 will be a worse car year—the models now being introduced differ little from the '58 crop. But if, as seems likely, economic factors also played a major role in holding down auto sales this year, then the outlook for 1959 is considerably brighter. Here's why:



- Consumer disposable income (income after taxes) is again running at record levels, and will continue to rise as the business recovery gains steam. But consumer prices have been leveling off. Families will thus have increasingly more discretionary income—money for nonessential uses.
- Consumer confidence, as measured by the University of Michigan Survey Research Center, has shown signs of firming. With recovery well under way, consumers may soon be feeling even more buoyant.

A combination of more income and greater confidence—but almost the same models—should add up to a respectable if unsensational car year in 1959. Our forecast: Sales of 5.5-million to 6-million new cars—300,000 to 400,000 of them foreign imports.

* * * *

When will the next auto boom materialize? That depends largely on when the auto industry exploits the potential of the "second-car market." Today, according to the Federal Reserve Board, about a third of the families with income over $10,000 own two cars. In the $7,500-$10,000 range, the fraction is about a quarter. And in the $5,000-$7,500 bracket it dips to about a tenth. A rise in multiple car ownership among these comparatively lower-income groups would give a powerful boost to auto sales. By producing a low-priced small car, U.S. car makers could greatly expand the second-car market—and persuade American facilities to make their second car a new car, not a used one.

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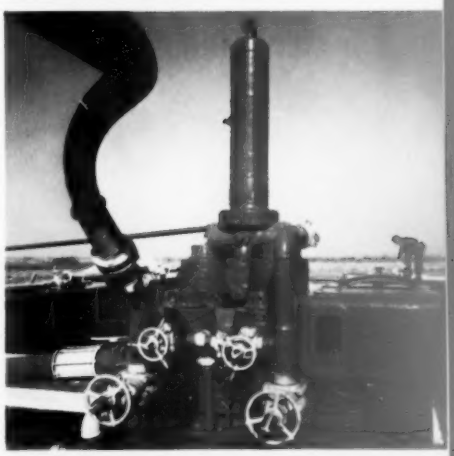

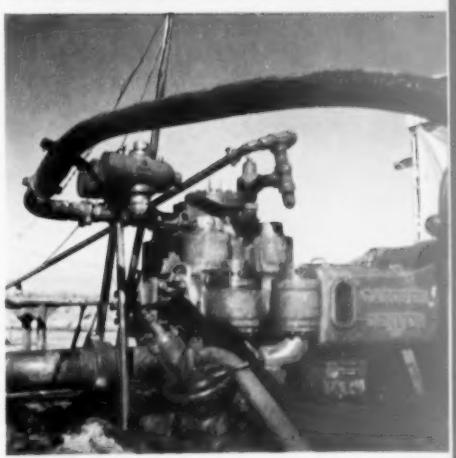

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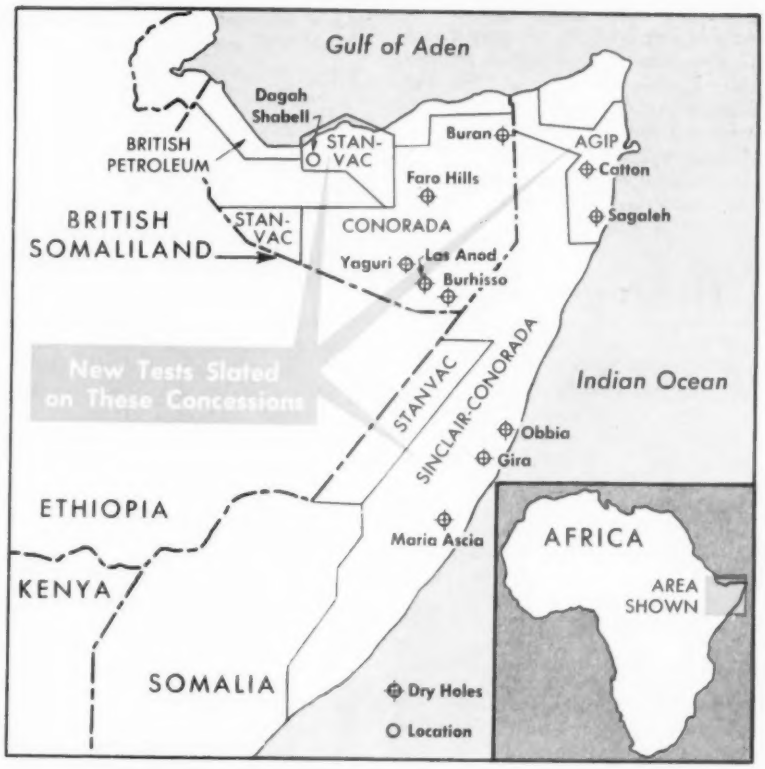
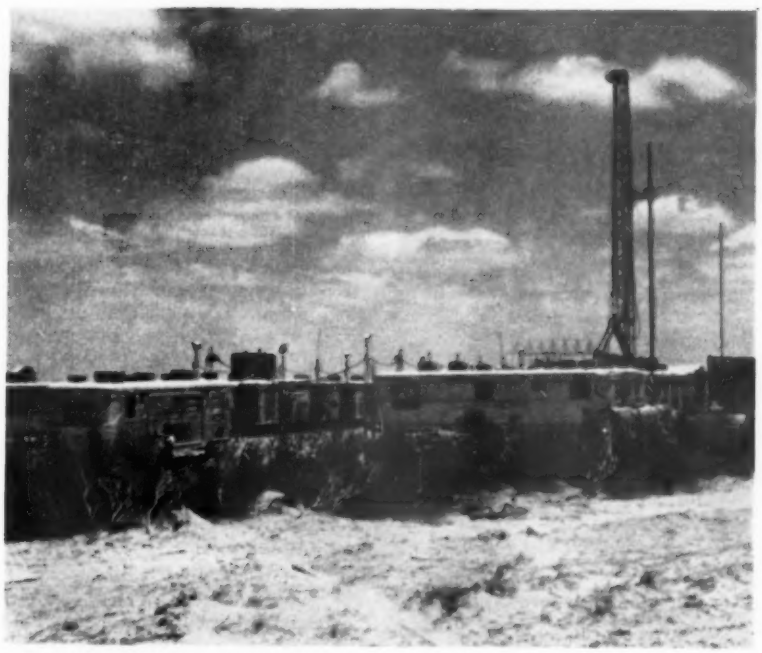
3 New Wildcats Slated in East Africa





AFRICA'S DEEPEST TEST, the No. 1 Obbia, was carried to 16,023 ft. by Sinclair Somal, on its Somalia concession, before being abandoned as a dry hole.

Perseverance still marks the search for oil in the East African states of Somalia and Somaliland. With ten dry holes to date, operators are moving ahead with plans for three new wildcats.

Five companies have a stake in these two areas. Thus far, however, no oil has been discovered south of the Hughada field, on the Red Sea coast of Egypt, which was found in 1913.

In Somaliland, a British protectorate, concessions are held by: the Conorada group (Continental, Ohio Oil, and Amerada) with 36,000 sq. mi., operated by Amerada; Standard-Vacuum with 11,000 sq. mi.; and British Petroleum with 6,000 sq. mi.

In Somalia, an Italian Trusteeship, Sinclair and the Conorada group have a 50-50 joint venture on 66,134 sq. mi., with Sinclair as operator; AGIP (the Italian state oil entity) holds 11,580 sq. mi.; and Stanvac earlier this year acquired 10,300 sq. mi. of acreage relinquished by Sinclair.

Standard-Vacuum will spud its first African wildcat in Somaliland around Dec. 1, near the site of the only notable oil seep in East Africa.

The No. 1 Dagah Shabell deep test will be drilled 30 mi. south of Berbera by Seacat Drilling Co., a U.S.-Lebanese contractor. The rig, now en route from Houston, is due to arrive next week.

In Somalia, Sinclair Somal is moving to its fourth location, after drilling three dry holes.

One of the dry holes, No. 1 Obbia, was the deepest test ever drilled in Africa. It was carried to 16,023 ft. The company's first test, No. 1 Gera, drilled by International Drilling Co., The Hague, was abandoned at 12,764 ft. And its third test, No. 1 Maria Ascia, was abandoned Sept. 3 at 13,500 ft.

The company has not yet announced the site of its fourth test. But, it says, the National 110 rig will soon be on it way. The company has a series of tests planned, although the total number of wildcats is still undecided.

Also in Somalia, the Italian state oil company is moving to its third location after drilling two dry holes.

AGIP, after suspending its first test, No. 1 Sagaleh finally bottomed it at 10,722 ft. Its second wildcat, No. 1 Catton, 40 mi. north of Sagaleh, was recently abandoned at 10,860 ft.

Stanvac is starting a survey by

two of its geologists on its new acreage in Somalia.

Field work is expected to be completed early in 1959. The two geologists will headquarter at Mogadiscio.

In Somaliland, the Conorada group has just drilled its fifth dry hole, the No. 1 Yaguri.

Its first two tests, No. 1 Las Anod and No. 1 Faro Hills, were abandoned below 5,000 ft. The company then in rapid succession drilled three other tests that proved dry.

British Petroleum will get a "wide-scale" geological survey under way shortly in Somaliland.

No drilling is expected in the immediate future, since the survey is slated to take three or four months.

Rumors about new interest in neighboring Ethiopia still persist, but to date there has been no activity since Sinclair pulled out in 1957. The Sinclair decision was made after results of a shallow and medium depth drilling program turned out poorly. The company was originally granted the concession in 1946.

Brazil Weighs Six Bolivian Bids

SAO PAULO—Brazil's Economic Development Bank is now studying six proposals submitted by private Brazilian capital groups for oil exploration in Bolivia, it was learned last week.

The six offers were received by the Sept. 12 deadline in response to the government's call for private groups to explore a 5,790-sq. mi. tract in central Bolivia, assigned to Brazil under settlement of a long-standing treaty (PW—Apr.25'58,p66).

Four of the six groups have already organized corporations for the Bolivian venture:

(1) Cia. Brazil-Bolivia de Petroleo, backed by the Soares Sampaio group, including the Uniao refinery interests at Capuava, in Sao Paulo.

(2) Petroleo Bolivia, backed by Rio de Janeiro industrialist Antonio Sanchez Galdeano.

(3) Petroleo Andino, backed by the Sul America and Rocha Miranda insurance interests, who are also backing the Petroleo Guarani S.A. (Pegasa) oil venture in Paraguay (PW—May2 '58,p39).

(4) An unnamed corporation, backed by a group headed by Sao Paulo industrialist Oscar Ferreira.

The other two groups are not definitely identified as yet. Before the deadline date, two others known to be preparing bids were headed by industrialist Baldomero Barbara, and by leading members of the Sao Paulo Industrial Federation.

The Brazilians involved have not disclosed whether any definite commitments have been made with U.S. or other foreign oil companies, for participation in their proposed Bolivian ventures, though it is known that discussions have been held on the subject.

Getty Starts Refining in Italy

Getty Oil Co.'s search for an outlet for its Persian Gulf crude has led to Italy. It's now concentrating on expanding recently acquired refining interests there.

Getty's Middle East oil comes from its fields in the Kuwait-Saudi Arab Neutral Zone, and from its share of the Iranian consortium.

The company quietly moved into Italy this summer, tabling a plan to build a new refinery in Germany to handle its Middle East production.

At that time, a company spokesman told PETROLEUM WEEK, Getty Oil acquired a 51% controlling interest in Soc. Golfo Industria Petrolifera, a refining company that owns a 30,000 b/d plant at Gaeta, near Naples. Getty had no previous interest in the firm.

Getty will probably acquire full ownership of the Italian refining company in the near future, the spokesman added.

Eugene P. Getty has been appointed a vice-president and director of Golfo. At the same time, the company's capital is set to be increased from the present 1.5-billion lire ($2.4-million) to 2.2-billion ($3.5-million).

Capacity of the Naples refinery will be brought up to 40,000 b/d by early next year under the expansion work now in progress.

Crude for the plant will be imported directly from the Middle East by Golfo, in Getty Oil tankers.

The company plans to export products from Italy, but just what markets it may aim for in the intensely competitive European scene has not been disclosed.

Shell Joins Refinery Plan

A modest beginning for oil refining in Guatemala is now set: Royal Dutch Shell will join a small U.S. refiner in setting up a 3,500 b/d plant near Puerto Barrios on the Caribbean.

The plan, which also involves Canadian Eagle Oil Co., was announced in Houston last week by Breaux Bridge Oil Refining Co., following the Guatemalan government's approval of its year-old application for refining rights (PW—Oct.4'57,p43).

The U.S. firm says the Shell-Eagle interests together will hold 50% interest in a separate refining company it plans to form for the project. (Canadian Eagle is closely allied with Shell.)

Breaux Bridge says Shell associates will supply imported crude for the plant. Shell's Guatemalan marketing company will buy the products.

Shell thus becomes the first major company to establish a refining toehold in Central America.

Though various refinery proposals for the region have been discussed over the past few years, the only other plants currently slated are to be built in Panama. Both are 55,000 b/d export refineries planned by U.S. interests. One is now under construction for a company owned by John Shaheen and Eugene du Pont III. The other is planned by the D. K. Ludwig interests.

The Guatemalan plant, small though it will be initially, would also establish a convenient outlet for any oil production developed in Guatemala, where exploration is only now beginning to move into the drilling stage. Shell is among the 20-odd oil companies that hold exploration rights.

The plan calls for construction of an entirely new plant at a cost of $3½-million to $4-million.

Breaux Bridge, which owns a 2,000 b/d plant in Louisiana, had originally planned to dismantle it and ship the units to Guatemala.

A Breaux Bridge spokesman says the refinery will be based on plans drawn up by Grebe & Doremus Process Co., and will have a crude topping unit, Unifiner, and reforming unit. Output will consist of two grades of gasoline, kerosine, diesel oil, Bunker C, and LPG.

The construction contract will be awarded by the end of this year, with operation expected by mid-1960. The plant is expected to reduce Guatemala's product import bill, which last year totaled over $16-million.

What's New / AROUND THE WORLD

New Oil Show in Libya

LIBYA—An "encouraging" show of oil has been found in the western Fezzan, 100 mi. northeast of production in the French Sahara.

The oil was found by Cie. Francaise des Petroles in its initial Libyan wildcat, on concession No. 49. A spokesman in Paris confirmed last week that the No. B 1-49 encountered oil at 4,600 ft. in the Tournaisian (Carboniferous). It flowed 20 bbl. of light crude mixed with salt water on a two-hour test of an undisclosed interval, and will be carried to 6,000 ft.

The find is about 100 mi. north of Esso's noncommercial show in a test at Atshan, also in the Fezzan.

The CFP well is about 100 mi. northeast of the three Sahara fields established by Creps, a Shell affiliate.

•

VENEZUELA—A new low-gravity oil pool has been proved in the Temblador area of South Monagas state by three wildcats drilled on a concession awarded last year to an eight-company group headed by Phillips Petroleum Co.

Phillips announced last week that each of the three Block 9 wildcats had encountered more than 350 ft. of net pay sand. The discovery well had gauges up to rates of 1,200 b/d, flowing and pumping from three zones of the Oficina sand between 3,200-4,100 ft. The other two wildcats, now being tested, are 4½ mi. and 5¾ mi. to the west, respectively, and a fourth has been spudded 4 mi. northwest of the discovery well.

•

VENEZUELA—Another pair of producers has been completed on Lake Maracaibo Block 1 by the Sun Oil-Atlantic-Texaco-Seaboard group.

No. 16 SVS was completed as a dual producer in the Eocene, testing 3,265 b/d of 35.2-gravity oil and 5,180 b/d of 35.7-gravity through ¾-in. chokes. No. 15 SVS flowed 940 b/d of 35.4-gravity oil through ½-in. choke and perforations at 8,447-594 ft., also in the Eocene.

•

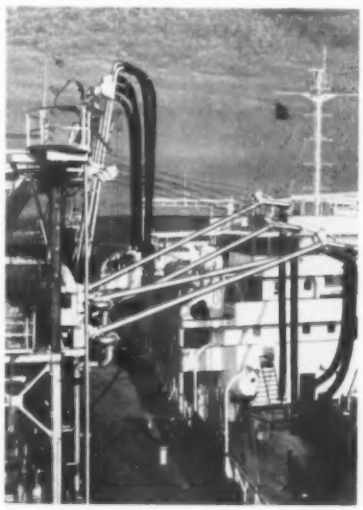
PAKISTAN—Hunt International Petroleum Co. and Pakistan Petroleum Ltd. have spudded their first joint test at Badhra, in northern Sind province.

The arrangement between the two calls for the testing of PPL's Badhra concession by Hunt at its own expense, and testing of the Mazarani concession by PPL at its own expense. Any production would be equally shared.

•

YUGOSLAVIA—The government is setting its sights on a phenomenal boost in crude production here. Plans call for an increase from about 6,000 b/d to 160,000 b/d by 1965.

The intermediate target is 18,400 b/d by 1961. About $260-million, government oil economists figure, would have to be spent on exploration and drilling to carry out the program.



Push-Button Loading

The overhead pipe gantry just installed on the oil jetties at British Petroleum Co.'s Kent refinery in England can discharge crude at the rate of 15,000 bbl. per hour.

Each of the main pipelines from the shore to the jetty ends at one of nine moveable, 36-ft. booms. Each boom is fitted with a 30-ft. rubber hose. Dual push-buttons at the upper deck and jetty levels operate electric motors which raise and lower the booms. The installation is designed to allow for a 60-ft. rise and fall in the ship's manifold.

WEST GERMANY—A German independent has come up with the deepest oil find in Germany, at 8,450-90 ft.

Deutsche Erdoel AG, Hamburg, found oil near the small town of Ploen, in Schleswig-Holstein. The well tested initially at the rate of 105 b/d through ⅛-in. choke.

•

ARGENTINA—Another oil development contract reportedly went to a U.S. oil company last week: Union Oil Co. of California.

It covers a 6,176-sq. mi. wildcat area in Chubut, northwest of proved acreage previously assigned to Pan American International Oil Co.

Union Oil Co. had "absolutely no comment" on the report.

•

VENEZUELA—The Signal Oil & Gas group plans to concentrate on development drilling for the rest of this year on Lake Maracaibo Block 4.

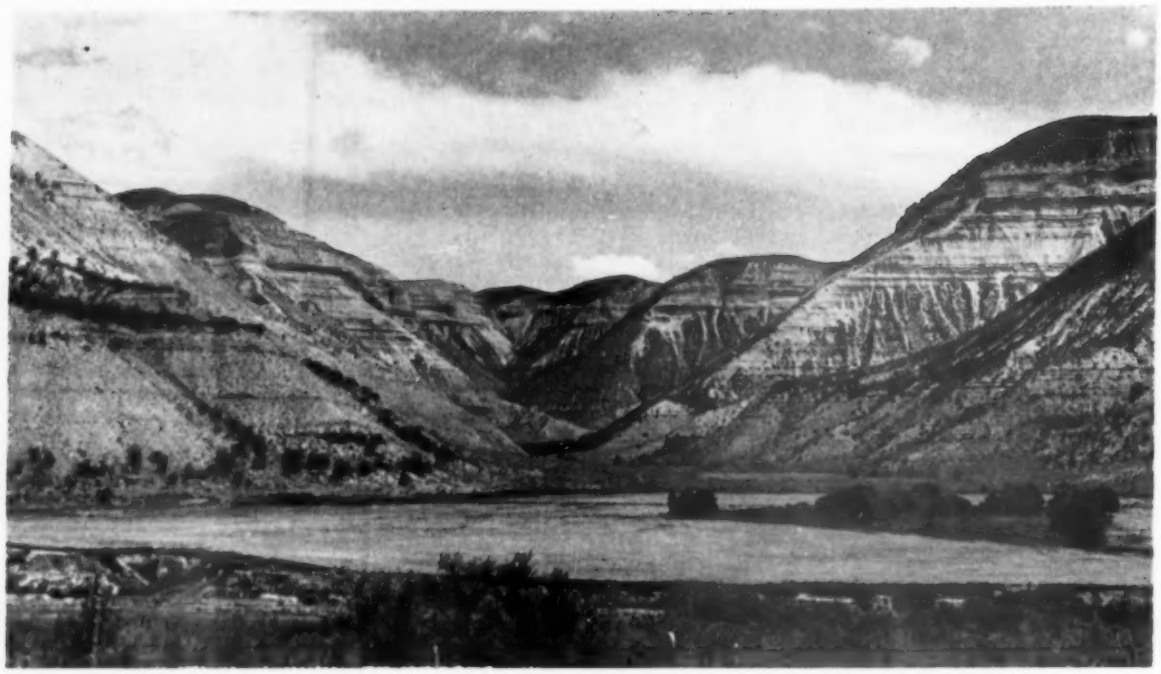
No. 8 Centro Lago, its second development well, is now being drilled near the center of the mid-lake block in a 2-sq. mi. area where the Nos. 2x, 3x, 4x and 6x exploratory wells and the No. 7 development well were completed as producers. The No. 5X wildcat opened another producing area in the northwest corner of the block. No. 1X was capped in the northeast corner. The group includes Hancock, Sohio, and Pure, and is slated to start production in the near future.

•

INDONESIA—A California firm, and not the Japanese, will help back a $10-million rehabilitation program for nationalized Royal Dutch Shell fields in north Sumatra.

Harold Hutton, president of Refining Associates, Inc., of Long Beach, announced last week that his company has arranged for a $500,000 monthly credit for P. T. Permina, the Indonesian government company that now holds the prewar fields. The credit will be used for equipment purchases, with Refining Associates providing technical assistance for the program only as needed. A Japanese group had recently been dickering with the Indonesians for development of the area under a semibarter deal (PW—Jul.18'58,p77).

Refining Associates is already shipping crude from the fields to Japan, as broker for Permina. The development program is expected to boost production to 18,000 b/d. Current output is around 8,000 b/d of 48-gravity crude.



VAST OIL SHALE DEPOSITS locked in the desolate terrain of northwestern Colorado could furnish "almost limitless" amounts of synthetic pipeline gas to the Far West and Middle West, according to Institute of Gas Technology reports that . . .

Fuel Gas Can Be Made from Oil Shale

Synthetic natural gas from Colorado oil shale could turn out more attractive economically than the manufacture of shale oil, according to spokesmen of the Institute of Gas Technology, the nonprofit research arm of the gas industry.

To date, the vast oil shale reserves in Colorado have been considered primarily as potential sources for liquid fuels. The Bureau of Mines, Union Oil company of California, and Oil Shale Corp. (the latter through the Denver Research Institute) have made extensive studies of methods to convert this hydrocarbon-bearing mineral into petroleum-like liquids.

However, recent work at the Institute of Gas Technology indicates that oil shale can be converted into a fuel gas with a high heating value.

Raw materials cost for the gas (not including plant or operating charges) would be about 30¢ per 1,000 cu. ft., assuming oil shale containing 30 gal. of potential oil per ton, according to E. B. Shultz, Jr., and H. R. Linden, of the Institute of Gas Technology, at the Chicago meeting of the American Chemical Society.

Finished synthetic fuel gas could be carried by existing long-distance transmission lines passing near the oil shale area and serving California, the Pacific Northwest, and the Middle West.

The process, called hydrogasification, is a one-step treatment of dry crushed shale with hydrogen at high pressure.

Processing temperature is 1,200F to 1,300F, and pressure is about 2,000 psi. The process converts 90% to 100% of the oil shale hydrocarbons into gas, Shultz and Linden reported, compared to only about 80% conversion (the rest being coke) in conventional retorts making liquid shale oil.

In the laboratory tests, nearly all of the organic matter in the shale was converted into fuel gases with heating values of over 800 Btu. per standard cu. ft. Only a little of the mineral matter in the oil shale was decomposed.

Hydrogasification test runs made with Colorado oil shale containing 23 gal. a ton gave a net yield of 2,300 to 2,500 standard cu. ft. of fuel gas per ton of shale.

Feed ratios were 3,800 to 7,600 cu. ft. of hydrogen per ton of crushed shale. Gross gas production per ton of shale processed was 4,900 to 6,600 cu. ft. of gas with a heating value of 1,000 Btu. per cu. ft.

However, part of the gas produced is used to make the needed process hydrogen, and part is used for plant fuel. Thus, the institute estimates only 2,300 to 2,500 cu. ft. per ton of oil shale would be available as pipeline gas.

The institute found that large shale particles (5 to 20 mesh) gave as good a yield as much smaller ones (140 to 325 mesh). This is important, the institute spokesmen said, since the cost of crushing shale is substantial and it is desirable to use as large a particle size as possible.

Institute tests also showed that the spent shale residue from the process is free-flowing, and does not agglomerate. This should permit the development of large-scale fluid-bed processes.

The institute estimates that the Colorado shale reserves alone could give a net yield of about 6,000-trillion cu. ft. of pipeline gas by using the hydrogasification process.

This figure is based on an estimated 1¼-billion bbl. of potential oil contained in the Colorado shale deposits. The estimated proved reserves of natural gas in the U.S. today total 246.6-trillion cu. ft., according to the American Gas Assn.

LA Fights Olefins in 'Gas'

California refiners are being threatened by a drastic curtailment of olefins allowed in gasolines marketed in Los Angeles County. The county's air pollution authority is trying to limit total olefin content in gasoline to no more than 12%.

The Los Angeles County Air Pollution Control District is now preparing a proposed rule which, if adopted, would prevent the sale of gasoline with more than 12% olefins. This proposed rule will be submitted to the Los Angeles County Board of Supervisors before the end of November.

A public meeting, at which refiners can be represented, will precede any final action on the rule. If it's finally adopted, the rule will have the effect of a California state law.

Olefins are the leading air-contaminating hydrocarbons in gasolines now sold in the Los Angeles area, according to S. Smith Griswold, chief district control officer.

Griswold reports that the Air Pollution Control District won admission from petroleum interests last week that olefins damage plant life and reduce visibility. Gasolines sold in the area contain up to 35% olefins.

The official reaction of the affected refiners is "hands off" until they have a chance to air their opinions at the public hearing. But off the record, industry spokesmen admit that they are "terribly disturbed" about it.

Major refiners in the California area were unanimous in refusing to comment on the proposed rule before presenting their cases at the public hearing. Standard Oil Co. of California expressed a majority view when it said, "It's an industry matter, not an individual company matter."

Union Oil Company of California added that the oil companies and the Los Angeles APCD work together very closely, and that the APCD, even now, is aware of the oil companies' feeling on the over-all aspects of the proposal. Union said, however, that this doesn't mean that the proposal will be palatable to the oil industry.

An official of the Western Oil & Gas Assn. said that it would reserve comment on the proposed rule until the control board formally submits a specific proposal. However, the association is staying abreast of the whole thing, and presumably will deliver a blast soon.

The biggest complaint voiced to date by oil industry spokesmen is that there is no efficient and economic way to remove olefins and maintain product quality with today's petroleum refining equipment.

An official of one East Coast refiner ridiculed the APCD suggestion that reduction of olefins in gasoline is simply a matter of using more catalytic reforming to substitute high-octane aromatics for the olefins. He insisted that refineries would almost have to be rebuilt to meet the lowered olefin requirements with over-all balanced refinery operation. And the cost, he said, would be "fantastic."

Other process units would have to be built, or expanded, to shoulder the basic octane load now carried by the refiners' work-horse process—catalytic cracking.

This could mean further emphasis on alkylation, catalytic reforming, polymerization, or isomerization to recapture octanes lost by a cutback in cat cracker olefin output.

But refinery product balance could be as worrisome as trying to find substitute octanes. A cutback in olefins via reduced cat cracking would leave huge quantities of fuel oil material to be disposed of by the refiner.

Cat cracking not only makes octanes, it's also a "fuel-oil reduction" process, which takes gas oil cuts (in the fuel oil range) and breaks the molecules down into lighter materials —including gasoline. So elimination of cat cracking could increase the supply of fuel oil tremendously, and could throw a panic into fuel oil marketing. This, in turn, could herald increased emphasis on another "fuel-oil reduction" process—coking.

The public would be the loser, according to one refiner. If refineries have to use more expensive means to make the needed gasoline octanes, and if they have to dump excess fuel oil at a sacrifice, the only way out would be to hike the price of gasoline.

"Who knows where such arbitrary meddling with refinery processing will end?" one refinery manager asks. "What assurance do we have that aromatics won't be the next victim?"

There is no real proof, he says, that aromatics have nothing to do with smog. He feels olefins are not so much worse than aromatics that they should be singled out for restriction. And after such a restriction has been in effect for a while, assuming it becomes law, what happens if there is no improvement in the Los Angeles smog?

A much better approach, this manager believes, is increased research to find an economical and efficient "smog absorber" to connect to auto mufflers.

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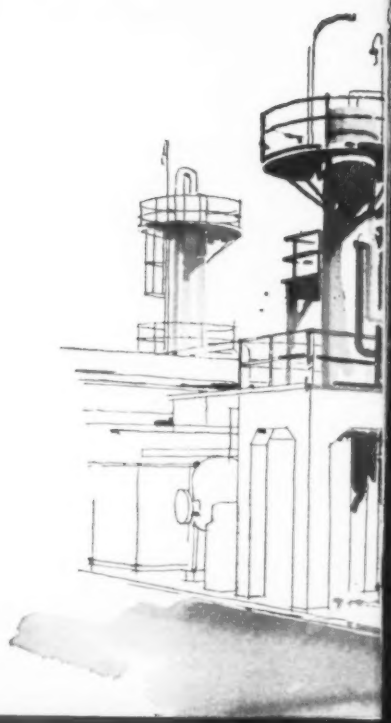

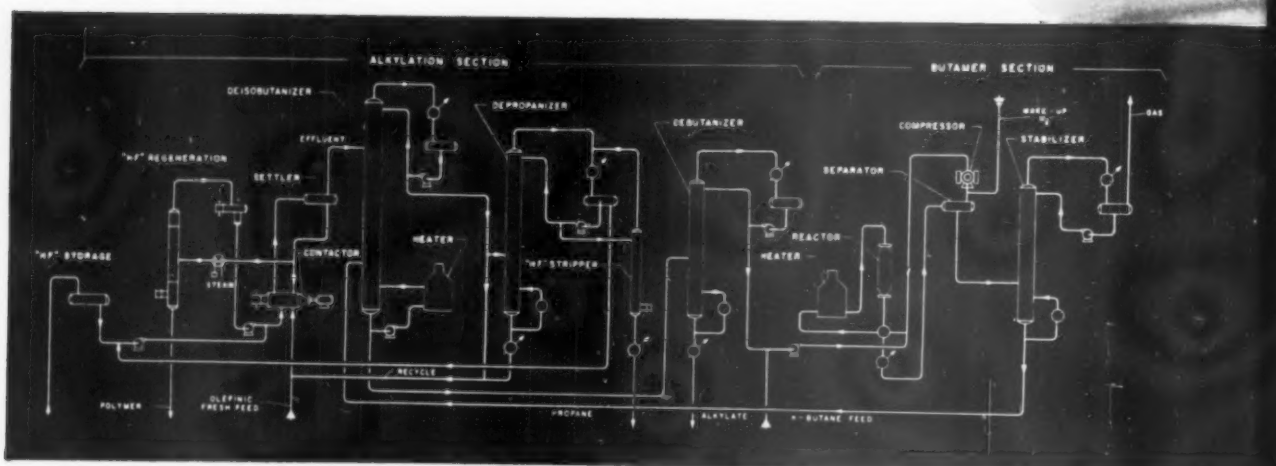

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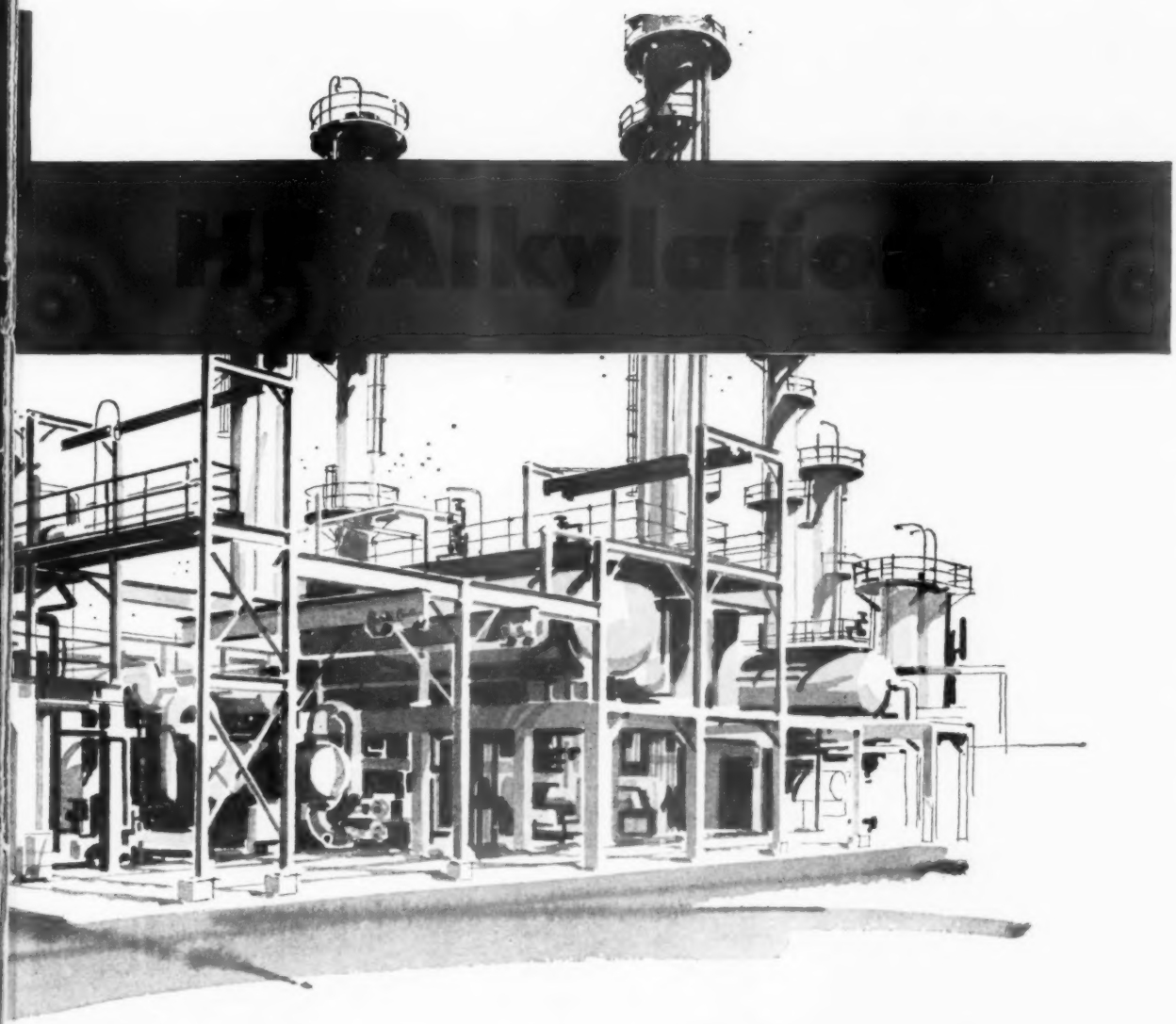

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What's New / IN PROCESSING

Derby Refining Co. plans to build a hydrofluoric acid alkylation unit at its Wichita (Kan.) refinery.

Capacity of the unit will be 1,700 b/d. Light hydrocarbons from Derby's cat cracker will be used as charge stock for the unit.

According to W. C. Norman, president of Colorado Oil & Gas Corp. (parent of Derby), the new unit will have a flexible design to provide for future production of petrochemicals, and to allow processing of isobutane or butanes from outside sources.

Completion of the unit is scheduled for May 1, 1959. Procon, Inc., will build it, based on a license from Universal Oil Products Co.

•

Celanese Corp. of America and Imperial Chemical Industries, Ltd., of Great Britain have formed a jointly owned subsidiary, tentatively named Lindum Fibers Corp., to produce polyester fiber in the U.S.

The fiber, to be called "Teron" has the same chemical composition (polyethylene terephthalate) as ICI's "Terylene" fiber marketed in Great Britain and Du Pont's "Dacron" fiber marketed in the U.S.

The plant will be built on one of several sites on which options have already been taken. Construction will start immediately upon final selection of the site, with work on the main plant to start in 1959. The eventual capacity of the plant will be 40-million lb. a year.

•

The Los Angeles County Air Pollution Control District has scheduled hearings for Oct. 22 on a proposed rule to limit the sulfur content of liquid and gas fuel in the Los Angeles Basin.

The APCD proposed rule would limit sulfur to 50 gains per 100 cu. ft. of gas, or to ½% by weight of liquid fuel (primarily residual fuels.) The rule would apply only during the smog season—May 1 through Oct. 31.

Private power plants and industries using boilers will feel the most impact from the rule.

•

Howe-Baker Engineers, Inc., Houston manufacturer of refinery equipment, is being acquired by National Aluminate Corp., Chicago.

According to J. A. Holmes, president of National Aluminate, Howe-Baker will operate under its own name as a subsidiary of Nalco. No change in Howe-Baker management is planned, but company headquarters have been moved to a new building in Tyler, Tex.

Acquisition of Howe-Baker will add a line of electrostatic desalting and purifying equipment to Nalco's services to the refining industry.

•

Pacific Supply Cooperative has signed a $2-million contract with Fluor Corp., Ltd., to engineer and build product tankage, truck and barge loading facilities, yard piping, utilities, and an office-ship building at Vancouver, Wash.

This work is in connection with a 15,000 b/d refinery planned by Pacific (PW—Jul.25'58,p39), which will

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cost $15-million. While it has not been announced, Fluor is expected to receive the contract for the refinery, also.

The refinery will be installed as soon as necessary import quotas can be arranged. This is expected to be within one to two years, according to Charles Baker, general manager of the company. Baker says Pacific plans to "build the most modern catalytic refinery possible" to produce both regular and high-octane gasoline, stove oil, and diesel oil.

One hurdle Pacific must clear before it builds the refinery is protests by suburban Vancouverites against the proposed site.

•

Continental Carbon Co. plans to expand the capacity of its Ponca City (Okla.) carbon black plant by 50%.

Work on the project, which will boost the plant's furnace black capacity from 50-million to 75-million lb. a year, will start within the next few months.

•

D-X Sunray Oil Co.'s catalytic cracking unit at Duncan, Okla., will receive a major revamping, at a cost of about $600,000.

Work will begin after the unit is shut down for inspection and turnaround about Nov. 1. One major change will be the installation of an 1,100-hp. gas-turbine-powered blower to increase coke burning capacity and, hence, unit throughput.

Other work will include installation of 12 new cyclones for improved catalyst recovery, and replacement of cast iron trays in the main fractionator with modern high-capacity trays.

The Refinery Engineering Co. will do the work, which is expected to take about three weeks.

Engineering studies are also under way on a proposed revamp of the gas concentration, alkylation, and tetramer units.

•

Only the harsh "facts of economics" prevent widespread use of atomic radiation for vulcanizing rubber, according to D. J. Harmon, of B. F. Goodrich Co.

Harmon told the Chicago meeting of the American Chemical Society that atomic energy is now being used in the laboratory to vulcanize nearly any rubber or rubber-like material, with results equal to or better than conventional chemical vulcanization.

Advantages of radiation vulcanization include "cold" processing, speed, and vulcanization of materials that are difficult or impossible to cure chemically.

However, the cost of radiation curing is about ten times that of chemical curing. This cost is only partially offset by the elimination of curing agents (such as sulfur and accelerators), which are a considerable portion of the cost of conventional curing.

•

The Bureau of Mines has released a publication listing U.S. patents issued on oil shale processes during the period 1946 to 1956.

Nearly 300 U.S. patents relating to retorting, refining, or utilizing oil shale or any of its products are included. There is also an alphabetical list of inventors and assignees.

This publication, entitled Bulletin 574, "Index of Oil-Shale and Shale-Oil Patents: 1946-1956, Part I, United States Patents," is the first of three in a series. Parts II and III, to be published soon, will present patents on oil shale issued in the United Kingdom and Europe, respectively.

The bulletin can be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D.C., for 60¢ a copy.

•

Bay Refining Co. will build a hydrofluoric acid alkylation unit at its Bay City (Mich.) refinery.

The unit will have a 750 b/d capacity, and will use the Universal Oil Products Co. process. Site preparation and foundation work began early in September. Completion of the unit is scheduled for June, 1959.

Southwestern Engineering Co. has the contract for both engineering and construction of the plant.

•

The American Petroleum Institute has released a new publication, entitled "API Recommended Practice for Inspection, Repair, and Rating of Unfired Pressure Vessels in Service in Petroleum Refineries."

The booklet, RP 510, covers the inspection, repair, evaluation for continued use, and computation of the maximum allowable working pressure, of unfired pressure vessels constructed in accordance with existing codes of API and ASME.

The publication is 20 pages long and costs $1.00 a copy. Orders should be directed to the Publications Department, American Petroleum Institute, 50 West 50th St., New York 20, N.Y.

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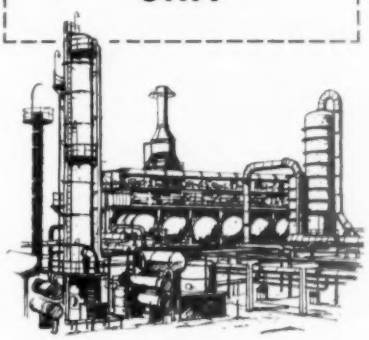

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Coming: More Gas Line Remote Control

Unmanned compressor stations may be the rule instead of the exception before too long. They're increasing in number on existing lines, as well as on lines now being built or planned.

There's growing conviction among gas pipeliners—and action to support it—that remote-controlled pipeline stations can be as helpful on gas lines as they have been on crude and product lines.

Natural gas transmission companies have by no means been "left in the dust" by their petroleum-transmission counterparts in the use of pipeline automation and its hand-servant, the unattended pipeline station. But generally, there has been more reluctance among the gas pipeliners to accept such equipment. Thus, the remotely controlled station has become a more important factor in crude and products pipelining than it has in transmission of natural gas.

But gasliners' reluctance on remote stations is fading. Here's why:

Economic factors at both ends of the gas industry are now making it more important than ever that savings be made in gas transmission. And more gas pipeliners are coming to feel that such savings can be had by the use of remote-controlled compressor stations.

One of these gas pipeliners, R. B. McLaughlin, of Northern Natural Gas Co., expressed this feeling last week at the annual petroleum conference of the American Society of Mechanical Engineers:

"The natural gas industry," McLaughlin said," has been faced with steadily increasing wellhead prices and increased operating costs over the past several years. At the same time, the industry has had to sell its product in competition with other fuels. This has brought about a situation whereby it has not been feasible to offset these increased costs with an increase in selling price.

"The only alternative, therefore, becomes that of lowering the unit cost of transmitting the gas from the source to the consumer."

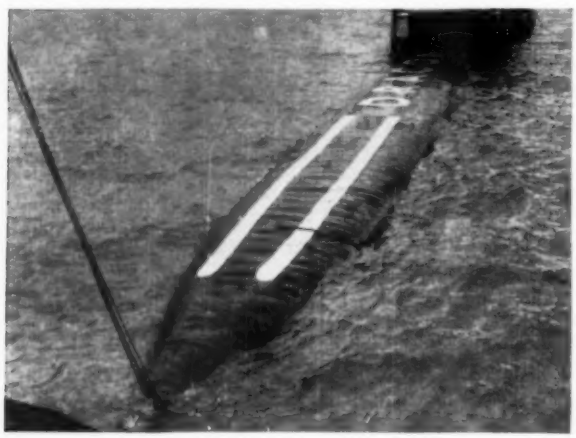
"The gas volumes through many stations will not justify a full time operator," he said, "yet contractual obligations require that the gas be taken at a daily rate over a period of years. This places the purchaser in a position of having to install equipment which may reasonably be expected to operate with a minimum of expense, without constant attention—in other words, equipment set up for automatic control."

It's no longer difficult to justify large amounts of expensive remote-control equipment at many of the large-volume compressor stations.

Not too long ago, when the accuracy of such remote-control equipment was still questionable, it was difficult to justify its high cost.

But the remote-control equipment of today, according to McLaughlin, "will perform just about anything in the way of compressor station operation that can be done manually. And in some cases automation will do it better."

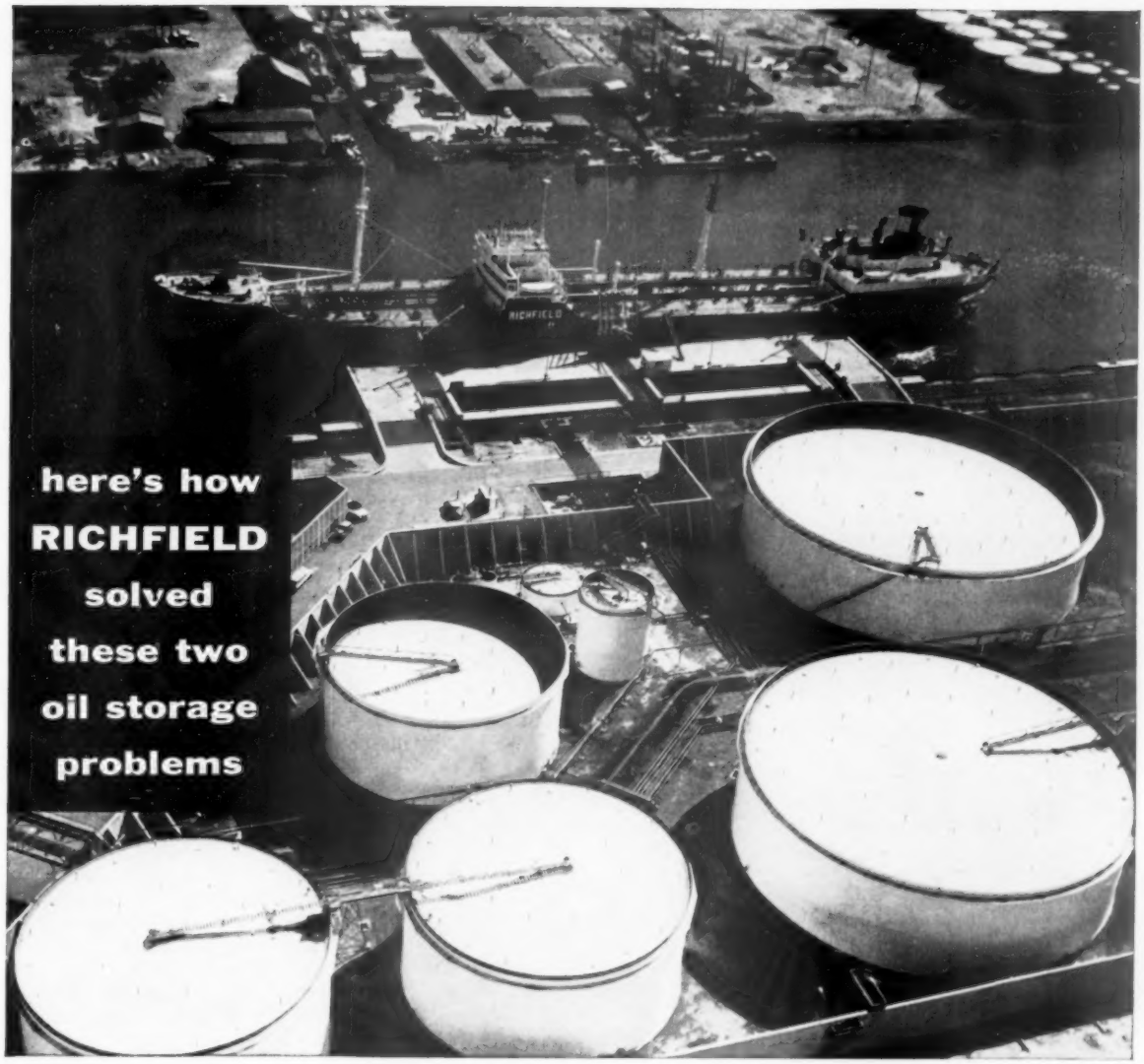
As a result, he says, automatic equipment for starting the com-



The Newest Sea Monster—An Oil Carrier

Nylon-rubber oil barges such as this "Dracone" are the big thing these days in Great Britain, and Dracone Developments, Ltd., maker of the barges, believes that they'll soon be bigger both in Britain and around the world.

The company recently showed off its new product—a 10,000-gal. "store-window" model—as an example of how such barges would work. Dracone intends to build 1,100-ton models for use on rivers and other inland waterways, and it says that ocean-going sizes which would carry up to 10,000 tons "are feasible on the basis of preliminary study." The model, 100 ft. long and 5 ft. deep, is the result of research which began soon after the British intervention in Egypt back in late 1956 (PW—Feb.8'57,p32). The barge can be unloaded and "put away" at the same time. As unloading proceeds at the stern, the nose of the barge is spooled flat on a floating reel (above, left). Dracone Developments says the barge developed little drag, about 800 lb. at seven knots, and that three could be towed by a 60-hp. tug. An important characteristic of the barge is its flexibility: It can be turned in much less than its own length by forming a fold (above, right). Deep sea tests of the barge will begin soon.



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pressor station, operating it under normal and emergency conditions, and shutting it down, could be justified in many cases by the operating savings that would result from such equipment.

Even at many compressor stations that handle smaller volumes, a limited amount of remote-control equipment can be used to save money.

At such stations, McLaughlin feels, the compressor unit "will not need more than automatic low-suction, high-discharge-pressure engine shut-down controls in conjunction with the usual low-lubricating-oil-pressure and high-jacket-water shut-down devices."

But the gas pipeliners are doing more than thinking about remote control. Upcoming major gas transmission systems will use such remote-control compressor stations widely.

The proposed Transwestern pipeline, which initially will take up to 350-million cu. ft. of gas daily from southwestern gas fields to the West Coast, is a good example.

The line will have, initially, 52,000 compressor horsepower, of which 35,000 hp. will be run on a remote-controlled basis.

Existing gas transmission lines are assimilating such unmanned pump stations into their systems, too.

Gulf Interstate Gas Co. is one of the leading exponents of converting to remote control. It recently put into operation five such stations on its Louisiana-to-Kentucky mainline.

Each of the unattended stations has a 14,000-hp. centrifugal compressor, making a total of 70,000 hp. operated completely and directly from the company's Nashville (Tenn.) office.

Columbia Gas System, Inc., which recently began action to buy up Gulf Interstate (PW—May23'58,p17), has also shown great interest in remote control.

Last year, Columbia started on a four-year program to install remote-control equipment at 50 locations on its 5,600 mi. of line in Kentucky, Ohio, West Virginia, Virginia, and Maryland.

Many other gas transmission companies are also either installing such equipment or taking a much closer look at its potential.

Still, there is a strong body of opposition to remote-control stations among gas pipeliners.

The head of one gas transmission company's communications section recently said that automation of gas lines poses "a problem different from liquid pipelines," due to high pressures and to input and output at different places. He said that remote-control of compressor stations, therefore, requires "just an awful lot of telemetered information."

But he conceded that, before too long, someone would probably "operate a fully-automatic gas line."

More recently, another anti-remote-controller was less willing to concede eventual defeat. He told PETROLEUM WEEK:

"It's all right to talk about remote-controlled stations for gas lines that have few takeoff points, and have stations in forsaken outposts. But for systems like ours, which have several hundred takeoff points, I can't see the worth of the investment."

Higher Efficiency at Higher Speeds

Oil industry marine experts will be taking a closer, longer look in the months ahead at the Navy's new propeller design, which, long-range, could cause a complete change in tanker design (PW—Sep.5'58,p40).

Oil-company marine designers contacted this week said that the new propeller may some day revolutionize tanker design because of the high speeds it can reportedly deliver. As a result, the designers are gathering as much information on the propeller as they can.

The new design minimizes the "drag" caused when a vapor pocket forms around the blade of a whirling propeller as it gains speed.

This vapor pocket, the Navy says, robs the conventional propeller of its efficiency. Therefore, ship engines that could produce from 6,000 to 10,000 rpm. have been geared down to around 200 to 400 rpm.

The new propeller, however, will be able to use close to the full power of the engines, thus giving the ship much greater speed.

The Navy, in revealing this information on the propeller, talked of speeds up to 60 to 70 knots for surface vessels, and of speeds up to 150 to 200 knots for underwater craft and hydroplanes.

The potential speeds offered by the new-type propeller probably will necessitate changes in the ships themselves, too, to withstand increased friction and pressure.

The Navy calls the development "unprecedented in the past 30 years of hydrodynamics accomplishment."

What's New

More LPG Caverns At Little Inch Terminal

Two more LPG storage caverns are being excavated near the Todhunter (Ohio) terminal of the Little Big Inch products line.

Cincinnati Gas & Electric Co. and Phillips Petroleum Co. will use the caverns now under construction. The utility will store up to 9.3-million gal. of propane in its cavern to supplement its gas supply for the Cincinnati area. It is also building a $1-million plant nearby to gasify the propane for subsequent shipment via the company's gas line into the city.

Phillips will use its cavern, which will be about the same size as the utility's cavern, to store LPG for future sale as a liquid.

Texas Eastern Transmission Corp., operator of the Little Big Inch system, is also building an underground cavern for LPG storage at Todhunter (PW—Aug.1'58,p39).

The caverns are expected to be completed about the middle of next year.

•

The Federal Power Commission last week approved two gas pipeline expansion projects, gave temporary authorization for three others, and accepted for filing still another two requests for such expansion programs.

• FPC gave final authorization to expansion plans of Cities Service Gas Co. and Pacific Northwest Pipeline Corp. Cities Service will build about 105 mi. of line in seven eastern Kansas counties, and will add 3,600 hp. to its Blackwell (Okla.) compressor station. It will also develop the Elk City (Kan.) gas storage field.

Pacific Northwest will construct about 50 mi. of 30-in. loops in Lincoln and Sublette Counties, Wyo.

• Cities Service Gas also received temporary authorization from FPC to add compressor horsepower at stations in Haskell County and Grant County, Kan.

Other temporary authorizations went to Michigan Wisconsin Pipe Line Co., to build about 25 mi. of loops near Madison, Wis., and to add compressor horsepower nearby; and to Transcontinental Gas Pipe Line Corp., to build about 15 mi. of 36-in. loops on its main line.

• FPC also accepted for filing

IN TRANSPORTATION

Texas Gas Transmission Corp's application to build 126 mi. of mainline loops and add about 11,000 compressor horsepower, and American Louisiana Pipe Line Co.'s request to build about 30 mi. of 12-in. lateral line from Big Lake Field, Cameron Parish, La., to its main line.

•

An application for increased tank truck shipments of petroleum products from Boise, Idaho, to other parts of the state and parts of Oregon has been turned down by the Interstate Commerce Commission.

ICC reversed an earlier decision last week when it ruled against Arrow Transportation Co.'s request for certification as a common carrier for petroleum products in the area. Phillips Petroleum Co. and General Petroleum Corp. had supported the Arrow request.

ICC denied the request because "there are no complaints by shippers of delays in present service, or of any other inadequacy . . . It appears that the shippers seek only to obtain additional service in the event of curtailment of transportation activities by existing carriers."

•

The Justice Dept.'s suit against A. S. Onassis may be on the way to a settlement out of court.

The Justice Dept. filed suit against Onassis early this summer for recovery of 14 tankers Onassis got in a trade-out agreement with the Maritime Administration a few years back. DJ sued because Onassis indicated that it would not be economically feasible for him to go through with his part of the trade-out deal—construction of several super-supertankers.

Now it appears that federal loan guarantees will be given Onassis for construction of the outsized vessels; that he will build them; and that DJ will withdraw its suit.

•

The Air Force is looking for someone to build up to 1-million bbl. of storage tank capacity for its installations in the Crockett-Martinez area of California.

The Military Petroleum Supply Agency will open bids on the request Nov. 4.

The Air Force estimates that yearly throughput of the facilities will be 3-million bbl. It wants to have at least half of the tankage ready for use by June, 1959, and the rest by October, 1959.

•

Line fill has begun on the pipeline that will link the Trans-Canada gas transmission system with its largest supply field.

The new line—the Alberta Gas Trunk Line—will take gas from the Pincher Creek (Alta.) field of British American Oil Co., Ltd., for delivery into the Trans-Canada system at a point near the Alberta-Saskatchewan border.

Regular delivery of gas from Pincher Creek will begin Nov. 1. The Pincher Creek line will carry about 70-million cu. ft. of gas daily during its first year of operation, with an increase in its capacity after that more than likely.

British American recently put on stream a $25-million gas processing plant at Pincher Creek to treat gas for the Alberta trunk line.

FIELD HOUSING
• Comfortable
• Durable
• Portable
This 8-foot by 30-foot portable bunkhouse is one unit of a complete portable camp produced by Houston Ready-Cut House Co. for a drilling company in Iran. The camp includes bunkhouses, offices, kitchens, laundry, messhalls and a bathhouse—each unit built for compact comfort, mobility and long service.
These units are aluminum-clad over exterior plywood. They are completely insulated, air-conditioned and electrically heated. Houston Ready-Cut delivers complete with bedding, furniture, laundry, shower and kitchen facilities.
Whatever your housing need, wherever you need it, Houston Ready-Cut can supply portable or prefabricated housing designed to economically meet your requirements. Phone FAirfax 3-9365, or write:
Houston Ready-Cut House Co.
P. O. Box 124 Houston 1, Texas
● Planning a beach cottage? A home in the country? Bet we've got the house plan you want. Save you time and money, too. Call us and see.
HOUSTON
Ready-Cut House Co.
PREFABRICATORS SINCE 1917 • CABLE ADDRESS: REDYCUT

HIGH VOLUME STATION, outside Esso's Bayway (N. J.) refinery, is a switch for Esso: 12 pumps, billboards—and no service bay.

A Major Brand Model Tries the 'Private-

Esso Standard Oil Co. is taking a close look at a new 12-pump, no-bay station. Obviously geared for high gasoline volume, the station has an aura of the major brand living in a private-brand house.

This station—which Esso tags as "modernized"—is right outside the company's Bayway refinery, in New Jersey. It's a completely new approach to station design for Esso, and is obviously experimental.

The rapid growth of private-brand marketers is getting increasing attention from oil management (PW—Sep.19'58,p94). A station such as this, simulating some of the techniques used by private branders, will provide operating experience for a major. Jersey Standard's purchase of top-ranking independents in the Midwest (PW—Apr.25'58,p88) would make such knowhow especially important if and when Jersey decides to expand the markets of those independents—Pate Oil, Oklahoma Oil, and Gaseteria.

The huge billboards and brilliant lights—a big departure from the traditional Esso station—are typical of the design trend in private-brand outlets.

The station is flanked by three oversize promotional billboards—more than 12 ft. high and at least 50 ft. wide (picture). One has an 8-ft. clock and an 8-ft. thermometer at either end of it, and advertises "New Formula Esso Extra." The copy on the signs is short and simple, but the bigness of the signs helps to give the station its appearance of expansiveness.

The station lighting has been described as the best Esso has anywhere, and obviously took a big bite of the construction budget. Each billboard is lighted by high-powered fluorescent tubes. Modern, wing-shaped fluorescents are mounted high above the pump islands. Over the entryways are high-powered incandescent lamps. The Esso oval sign is nearly twice as big as those at most Esso stations.

Total effect of the lighting is that it sheds what appears to be an "umbrella" of light over the entire station area.

Another private-brand characteristic: an outside lift instead of the one or more service bays usually seen at major-brand stations. There's even a trading-stamp sign.

The outside lift is for emergency repairs only, since most of the station revenues are expected to be from gasoline and lube sales. The station layout would permit the addition of lube bays later on, however, if such facilities are needed.

There is at least one important difference between the typical private-brand station and this Esso facsimile. This lessee-operated Esso station maintains New Jersey fair trade prices, along with other fair-trading major-brand dealers. A comparable private-brand outlet would probably sell about 2¢ or 3¢ under the major-brand price. The lessee-dealer of the Esso station does give trading stamps, however, which are considered by many to be practically tantamount to a price-cut in New Jersey.

Oceans of driveway space surround the four pump islands.

The station plot measures more than 250 ft. by nearly 90 ft., and the small size of the building allows even more driveway space. The big driveway is typical of stations designed for easy access, quick servicing, and high gasoline volumes.

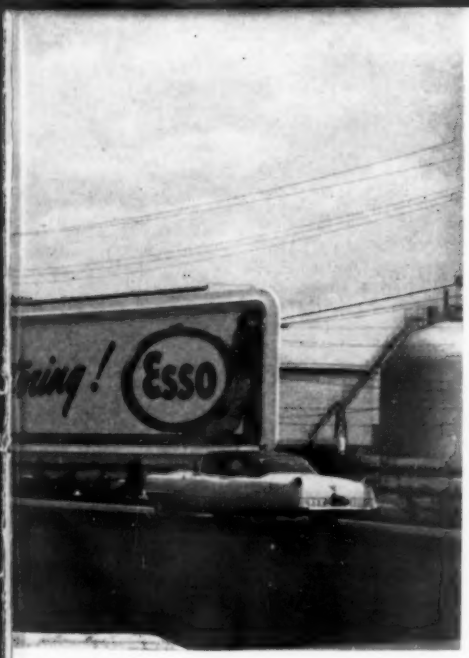
The fact that Esso has four pumps dispensing each of its three grades of gasoline makes it economical to use a submerged turbine pumping system. The dealer or attendant starts a remote pumping unit merely by flipping a switch.

At the back of this roomy-looking service area is a tiny, low-cost station building, which was put up in two days. It usually takes two or three months to put up an average station building, while this entire station area was constructed in less than 60 days.

The building, 22 ft. by 13 ft., has a sales room, storage space for oil and TBA items, and restrooms. The building is largely constructed of aluminum, with some glass, and porcelain enamel. Its design is so simple that it can be "hosed down," much as an automobile would be washed with windows rolled up.

This type of building could also be used for smaller outlets with fewer pumps, less space, and less elaborate trimmings. If so, the station cost would be competitive with the most economical station.

Located on U. S. 1, one of the nation's busiest highways, the station remains open around the clock.



Brand Look'

Traffic counts indicate that some 25,000 vehicles use this stretch of highway every day. The 13-mi. section of U. S. 5 between Newark and Woodbridge Circle has 68 service stations, which get most of their volume from gasoline sales to commuter and transient trade.

Esso has had a station on this spot outside its Bayway refinery for nearly 25 years. This summer the old station was torn down, the driveways were resurfaced and enlarged, and the new experimental station was put in its place.

Operating on a 24-hour basis is far more common among the private-brand outlets than it is with major-brand stations. Most major companies have about 5% of their stations on a 24-hour schedule, according to industry statistics, and the percentage of major-brand stations open past 9 p.m. is seldom more than 50%. By contrast, about 65% to 80% of private-brand stations are open 24 hours, and almost none close before 9 p.m.

It's still too early to evaluate the station's success, or to anticipate how extensively Esso and other Jersey Standard affiliates may use this type of outlet.

The station has been open only about a month. About all that can be said so far is that the station's appearance has attracted some favorable attention.

In any case, the station highlights the growing trends toward bigger stations and toward increased major-company emphasis on station lighting.

What's New / IN MARKETING

Marketer Outlines Steps For 'New Era' Success

A seven-point operating program for maximum marketing progress was outlined last week by a Pure Oil Co. marketing official before the Ohio Petroleum Marketers Assn.

Harry L. Moir, assistant vice-president and general manager of retail marketing for Pure, urged oil companies to prepare for the "new era" by taking the following measures:

(1) "Select service stations with more care—reduce overbuilding and subsequent market dilution."

(2) "Continue to liquidate obsolete service stations."

(3) "Exercise more care in dealer selection and training."

(4) "Act individually to bring supply more in balance with demand."

(5) "Eliminate tendencies to cure all industry ills by price signs."

(6) "Have more confidence in our industry."

(7) "Operate so as to avoid government controls—by all means."

"It is going to take courage," said Moir, "to make many needed changes in our marketing procedures and concepts. How agile we are in changing our methods may be the difference between success and failure."

•

Sinclair Refining Co. is splitting its 36-state marketing territory into two regions, to get "greater coordination and concentration of sales efforts." L. W. Leath, vice-president and general sales manager, will head the western region; L. J. Hoar, vice-president and newly appointed general sales manager, will be in charge of the eastern region.

•

American Oil Co. is going to try a new portable service station, which is built and equipped in a factory and then moved in two sections to a station site.

The full-size station—49x28 ft., plus canopies—has two lube bays. All equipment, wiring, and fixtures are installed at the factory. The station can be assembled on the site in one day.

The station has "built-in insurance" in case of highway changes, according to Amoco, because the building can be jacked off the foundation in a few hours and relocated with minimum expense.

It takes about six weeks for the factory to build the station. The site can be prepared simultaneously.

A model station, now being built, will be set up at Haledon,N.J., in late October.

•

American Petrofina, Inc., last week introduced its own line of branded motor oil, in three grades. The top two grades are packaged in aluminum cans on an experimental basis.

The addition of the motor oils is part of the company's program to develop a complete line of products. New lubricating greases are to be introduced sometime this month.

•

Anchor Petroleum Co., Tulsa, a nationwide marketer of LP-gas and other oil products, has acquired a controlling interest in Petrolane Gas Co. and its subsidiaries. Petrolane—a large distributor of LPG in Louisiana, Mississippi, and Alabama—will continue its operating headquarters at New Orleans. The key personnel of Anchor will become officers and directors of Petrolane.

•

A new campaign is under way in California either to ban or to regulate the use of trading stamps, with the hassle expected to come before the state legislature in January.

The State Senate's interim committee on business and professions heard evidence this week on the following proposals:

- To prohibit the use of stamps.
- To require payment to the state of the value of unredeemed stamps, after a stipulated number of years from the date of issue.
- To levy a tax on stamp companies and/or issuers of stamps.
- To restrict the use of stamps with goods or services controlled by price laws, such as fair trade acts.
- To require stamp companies to be incorporated, and/or to require the posting of bonds or other security.
- To make optional cash redemption of stamps mandatory.
- To establish joint liability for a stamp company and its issuers.

CLASSIFIED

DISPLAYED RATE

The advertising rate is $16.75 per inch for Equipment and Business Opportunity advertising appearing on other than a contract basis. Contract rates quoted on request.

Employment opportunities—$22.00 per inch, subject to Agency Commission.

UNDISPLAYED RATE

$1.80 a line. Minimum 3 lines. To figure advance payment count 5 average words as a line. (See¶ on Box Numbers.)

POSITION WANTED. Undisplayed rate is one half of above rate, payable in advance.

PROPOSALS, $1.80 cents a line on insertion.

INFORMATION

BOX NUMBERS count one additional line in undisplayed ads.

NEW ADVERTISEMENTS accepted 10 days prior to issue date.

REFINERY MANAGER

Must have operating and administrative experience. Chemical or Petroleum engineering background helpful. All replies confidential, salary open. West coast refinery.

P-8948 PETROLEUM WEEK
1125 W. 6th St., Los Angeles 17, Calif.

PETROLEUM MARKETING SALES EXECUTIVE

Expanding oil company. Position requires experience sales management, sales promotion and direct sales. Experience in southeast United States preferable. Experience in south a must. Send background resume with photograph. All information confidential.

P-8952 PETROLEUM WEEK
520 N. Michigan Ave., Chicago 11, Ill.

POSITION VACANT

Wanted: Pump Sales Engineer, Phoenix Area, experienced all phases deepwell turbine pumps, primarily farm accounts, salary and commission. Write stating experience, age, marital status to Hanson's Pump and Machine Works, 2310 West McDowell, Phoenix, Arizona.

BUSINESS OPPORTUNITY

For Sale In Guatemala 1,000 plus acres agricultural and timber land forming part American oil company oil concession. For map and further information, write A. Sinibaldi, 1441 West San Carlos, San Jose 26, California.

BUSINESS OPPORTUNITIES

Use this Classified Advertising Section for bringing business needs or opportunities to the attention of men associated in administrative, executive, management, sales and responsible technical, engineering and operating capacities within the oil industry.

PETROLEUM WEEK

DEPT/Service & Equipment Companies

T. P. TARWATER is the new president of CP-Harrisburg, Inc., oil field equipment distributor in Fort Worth. Tarwater, formerly general manager of sales for Mid-Continent Supply Co., Fort Worth, replaces **Ken W. Davis,** who is now chairman of the company. **R. C. Holden** has been named vice-president of CP-Harrisburg; **J. E. Snoddy,** Houston, and **C. B. Caldwell,** Oklahoma City, were named division managers. **W. S. Sease,** Fort Worth, is sales manager, and **R. F. Timmons,** New York, is export sales representative.

F. W. Richmond

T. P. Tarwater

FREDERICK W. RICHMOND has been named chairman of Houston Oil Field Material Co., in which he recently purchased a major interest. **L. Joseph Lawrence,** with HOMCO for the past 23 years, has been named executive vice-president and chairman of the newly established management committee. **Huntingdon T. Hamm** has become secretary-treasurer, and will also retain the post of comptroller.

ART MAKRIS has been appointed sales engineer for heat exchangers for ALCO Products, Inc., Houston. Makris joined ALCO last year in the petroleum industry equipment division, at Houston. **M. R. Lovering** has been named sales engineer in heat exchanger repair and rebuilding, with headquarters at ALCO's plant in Beaumont, Tex.

K. S. (Speed) DANNENFEISER was appointed manager of Sauder Tank Co.'s new branch sales office in Pratt, Kan. **Tom R. Dome,** formerly staff engineer at Baton Rouge, has become sales engineer at the company's home office at Emporia, Kan.

E. H. NIXON, JR., is manager of Lufkin Foundry & Machine Co.'s new Sterling (Colo.) office, handling sales and service of the company's oil field equipment in the Denver-Julesburg Basin area. Nixon, engaged in oil field sales since 1952, has had a year of factory training at Lufkin's home offices in Lufkin, Tex.

K. L. BYERLY, JR., has become vice-president of Magcobar de Venezuela, C.A., Caracas, subsidiary of Dresser, A.G., overseas affiliate of Dresser Industries, Inc., Dallas. Byerly, general sales manager since 1958, will continue to be responsible for that post. Before joining the drilling mud service company in Venezuela, Byerly was assistant to the president of Magnet Cove Barium Corp., also one of the Dresser Industries.

GEORGE M. SEIB, formerly secretary of Oakite Products, Inc., has been appointed vice-president of that company. **Erwin H. Steif,** formerly Seib's assistant, replaces him as secretary. With Oakite since 1922, Seib has been a member of the board since 1946, and has served as secretary since 1953. Steif joined the company as legal counsel in 1948, and was elected a director in 1953.

GEORGE M. DAVIS is president of BJ Service of Canada, Ltd., a new company formed by Thorson Oilfield Cementing, Ltd., Strata Testers, Ltd., and BJ Service, Inc. **A. E. Thorson,** formerly president of Thorson Oilfield Cementing, is vice-president of the cementing division, and **Murray Varty,** formerly president of Strata, is vice-president in charge of the testing division. Administrative offices for the new company are in Edmonton, with a network of field stations throughout Canada's major oil and gas producing area.

R. E. (Dick) SCHEIBEL is head of Continental-Emsco Co.'s new industrial sales department, responsible for direct and dealer sales of the company's swivel joints and other industrial products. Scheibel, formerly division merchandise manager, will be located in Dallas. The new department will be a part of the machinery and miscellaneous sales division, and will be under the supervision of **W. C. Kinder,** Continental-Emsco vice-president.

HOWARD M. THOMPSON has been appointed manager of the field application department of Warren Automatic Tool Co., Houston. In his new position, Thompson will be responsible for the practical application of new and improved instruments in the oil field. Thompson resigned from Stanolind Oil & Gas Co. in 1953, and has been an independent oil operator since that time.

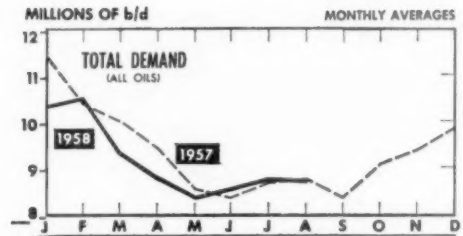
R. N. Maples

E. E. Storey

E. E. STOREY has been named supervisor of tank sales, and **R. N. MAPLES** manager of the traffic department, for Jones & Laughlin Supply Division, in Tulsa. Storey was most recently associated with Continental Tank Co. as Tulsa branch manager in charge of sales. Maples has been with the Southwestern Freight Bureau, in St. Louis.

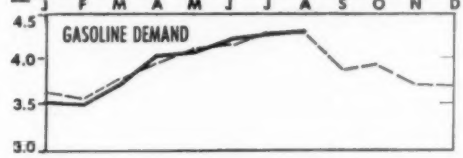
PETROLEUM WEEK'S

Fingertip Figures



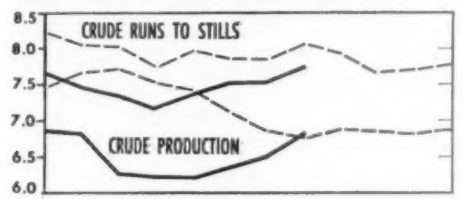
TOTAL DEMAND

Latest 4-week average	8.617
Year ago	8.357



GASOLINE DEMAND

Latest 4-week average	4.079
Year ago	3.897

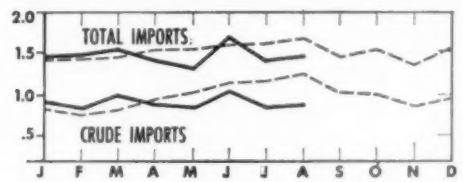


RUNS TO STILLS

Latest week	7.639
Previous week	7.604
Year ago	7.918

CRUDE PRODUCTION

Latest week	7.100
Previous week	7.087
Year ago	6.821

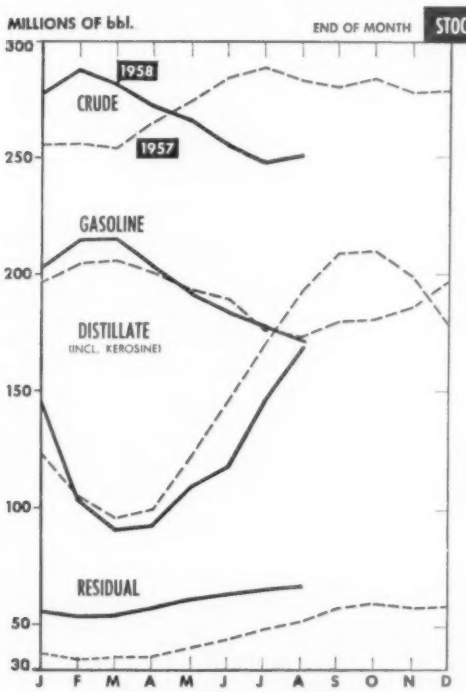


TOTAL IMPORTS

Latest week	1.927
Previous week	1.460
Year ago	1.360

CRUDE IMPORTS

Latest week	1.320
Previous week	.860
Year ago	.964



CRUDE STOCKS

Week-ended 9-20	242.6
Previous week	240.7
Year ago	283.6

GASOLINE

Latest week	173.5
Previous week	173.2
Year ago	177.4

DISTILLATES

Latest week	184.6
Previous week	179.5
Year ago	205.6

RESIDUAL

Latest week	69.6
Previous week	68.9
Year ago	57.7

The concern over the present level of crude inventories raises the question of what constitutes adequate stocks (page 11).

It will be an almost impossible question to answer without a realistic survey of the actual inventory needs of each individual refiner.

Certainly, two important considerations to keep in mind are the level of product inventories and the growth trend of demand. But there are other factors.

The words "tight" and "low" used in describing crude inventories reflect the comparison of the current storage volume with some other period, when inventories were higher.

To carry the comparison to an extreme, crude stocks at the end of 1929 totaled 428-million bbl., or nearly twice the current supply in storage. But refinery runs so far this year, averaging nearly 7.6-million b/d, are 183% higher than in 1929.

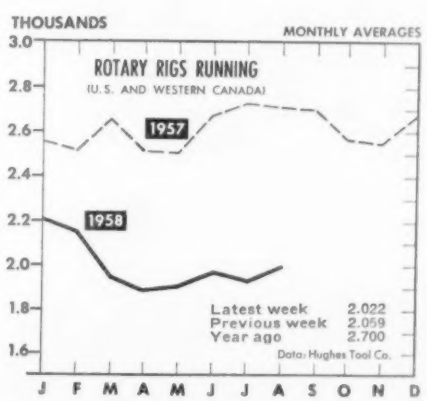
Using the National Petroleum Council estimate that only a third of the crude inventory is actually "available," the 1929 stocks were equal to a 53.8-day supply based on average runs at the time.

Figuring on the same basis, today's crude stocks are equal to a 10.5-day supply.

Despite the growth in demand and refinery runs over the years, less crude stocks are actually needed now—due primarily to the greatly expanded transportation network.

The primary arteries of transportation—the nation's network of trunk crude pipelines—are now several times larger in mileage and many times larger in capacity than in 1929.

Another important link in the transportation network is the availability of foreign crude, now moved in supertankers direct to coastal refineries.



The Market Trend

That Crazy Mixed-Up Product: No. 6 Fuel

The heavy fuel situation is a tough one to figure. Tenuous price advances seem to point to still higher levels in some areas. In others, overdue price reductions are made—and then get partially rescinded.

It's confusing, for example, that inland prices have been going up while seaboard prices were falling. Mid-Continent prices for No. 6 oil have pushed up 10¢ a bbl. to $1.40. Gulf Coast cargo prices have fallen from $2.25 to $2.00. The net effect is the curious paradox that results in Chicago prices (influenced by the Mid-Continent) up 0.25¢ a gal., and prices at Buffalo (influenced by New York) down 0.4¢.

It's odd, too, that some prices have risen even though sellers expressed strong doubts that the new level would hold. This was particularly true in the Upper Midwest. Sellers there feel they'll have many weeks to worry whether their 0.25¢-a-gal. advance can stick—until natural gas supplies are curtailed (it says here in fine print) some time late in the fall.

And it was a real mystery to traders that Mid-Continent No. 6 oil prices worked their way up 10¢ a bbl. to $1.40. At present rail rates, it would take a 30¢ discount in Oklahoma to compete in Chicago, and almost that much to get under $2.00, the f.o.b. cargo price at the Gulf. Mid-Continent refiners shrug it off and say they're making asphalt.

On the East Coast, everybody is asking what the price is. The trouble is that barge prices are subject to 16¢ "voluntary discount" in some areas, to 8¢ in other areas, and to none at all in still others. Delivered cargo prices at New York range anywhere from $1.94 to $2.09.

And it's just as well that nobody lists a cargo price for heavy fuel on the West Coast. As one trader put it: "They're asking firmer prices out there, but it's actually weaker, if you get what I mean." What the trader meant was that West Coast residual stocks add up to an uncomfortable 34-million bbl. That figures about 300 cargoes.

The add-up: Mid-Continent refiners feel good about residual until they have to start making more of it; Caribbean suppliers are licking their wounds; Gulf Coast refiners are "facing uncomfortable facts."

No. 6 vs. Gas: Natural gas was fingered this week as stealing 450,000 b/d of oil markets in California, Oregon, and Washington. Gas imports (not oil imports) were cited when California Standard cut its fuel oil prices 35¢ and heavy crudes 50¢.

Newcomer In The East? Just to complicate things, the hot rumors are that one major has decided to get into the heavy fuel market in the East on a much larger scale than heretofore. The major has offered commissions on bunkering sales —something not all majors do. It has also approached some New York barge terminal operators to sell long-term contracts.

Gasoline—Down 0.25c: Gasoline prices fell back 0.25¢ at the Gulf last week. Most of the pressure to move product probably came from two or three sellers. But, as one trader expressed it, "Every refiner has at least one cargo to spare." Nobody, apparently, was able to sell anything.

The Market Place

AROUND THE WORLD

Prices compiled for PETROLEUM WEEK by Platt's OILGRAM Price Service and National Petroleum News, McGraw-Hill Publications

All prices as of September 29

Bold face type indicates changes from previous week

KEY PRICES—REFINED PRODUCTS

(¢ per gal. except dollars per bbl. where $ is shown)

Western Hemisphere

U.S. Gulf Coast, cargoes	
Gasoline, 98 oct prem	**12↓-12.875**
Gasoline, 92 oct reg	**10.75↓-11.5**
Kerosine	8.875-9.125
Heating oil, No. 2	8.625-9
Gas oil, 48-52 d.i.	8.875-9.5
Fuel oil, bunker "C"	$2.00-2.25
Caribbean, cargoes	
Avgas, Grade 100/130	16
Gasoline, 93 oct research prem	**11↓**
Gasoline, 87 oct research reg	**10.125↓**
Gasoline, 79 oct research	**9.375↓**
Gasoline, 70-72 oct motor method	**9.25↓**
Kerosine	9.125
Heating oil, No. 2	8.625
Gas oil, 48-52 d.i.	8.875
Fuel oil, bunker "C"	$2.00
New York Harbor, barges	
Kerosine	9.95-10.2
Heating oil, No. 2	9.45-9.7
Fuel oil, No. 6	$2.29-2.45
Okla-Group 3, northern shpt., bulk	
Gasoline, 89 oct reg	12-12.75
Kerosine	10-10.5
Heating oil, No. 2	9
Fuel oil, No. 6	$1.40-1.45
Chicago, bulk	
Gasoline, 91 oct reg	**11.5↓-12↓**
Heating oil, No. 2	9.5-11.35
Fuel oil, No. 6 high sulfur	6.9-7
Los Angeles, rack	
Gasoline, 88 oct reg	12-13.6
Diesel fuel, PS 200	10-11.25
Light fuel, PS 300	$3.05
Heavy fuel, PS 400	$2.50-2.70
Natural Gasoline, Grade 26-70	
FOB Group 3	4.5
FOB Breckenridge, Tex.	4
LP-Gas	
Propane, Oklahoma (Group 3)	5
Pennsylvania Lubes	
Bright stock, 25 p.t.	22
200 vis. neutral, 25 p.t.	21
Mid-Continent Lubes, Tulsa basis	
Bright stock, solvent, 95 v. i.	23-24
Neutral, solvent, 200-210 vis.	19.5-20.5
Gulf Coast Lubes	
Bright stock, solvent, 95 v. i.	24
Neutral, solvent, 200 vis.	20.5

Eastern Hemisphere

Singapore (Pulau Bukom), cargoes	
Avgas, grade 100/130	17.25
Gasoline, 79 oct research	10.375
Kerosine	10.375
Gas oil, 48 d. i. minimum	10.25

KEY PRICES—CRUDE OIL

(2¢ differential per deg. of grav. applies except as noted)

Western Hemisphere

United States (at the well)	
Mid-Continent, 36.0-36.9	2.83-3.07
North Dakota, 36.0-36.9	3.07
Texas:	
Gulf Coast, low cold test, 26.0-26.9	3.50
Gulf Coast, Upper & Lower, 26.0-26.9	2.92-3.22
West Texas, sweet, 36.0-36.9	3.00-3.07
West Texas, N. M., inter., 36.0-36.9	3.00
West Texas, N. M., sour, 32.0-32.9	2.86
East Texas, flat	3.25
Mirando, 28.0-28.9	3.31
Illinois Basin, flat	3.00
Pennsylvania Grade, Bradford dist., flat	3.90
California, Signal Hill, 21.0-21.9	2.63-2.73†
North Louisiana-Arkansas, 36.0-36.9	2.82-3.02
Wyoming, sweet, 36.0-36.9	2.90-3.00
Wyoming, sour, 32.0-32.9	2.71
Canada (flat prices, at the well)	
Acheson-Stony Plain (Alta.)	2.61
Leduc-Woodbend (Alta.)	2.67
Redwater (Alta.)	2.56
Daly (Man.)	2.39
Smiley (Sask.)	2.33
Venezuela (Cargoes, FOB lifting port designated)	
Cumarebo, 48.0-48.9, Tucupido	3.75
San Joaquin, 41.0-41.9, Puerto la Cruz	3.34
Oficina, 35.0-35.9, Puerto la Cruz	3.05
Tia Juana, Medium, 26.0-26.9, Amuay	2.55
Bachaquero, flat, Las Piedras	1.93-2.08
Tarra, 38.0-38.9, San Lorenzo	3.08
Lagunillas Heavy, flat, Cardon	2.25

†*Differential per deg. of grav. varies.*

Eastern Hemisphere

Middle East, Persian Gulf (Cargoes, FOB lifting port)	
Arabia, 34.0-34.9, Ras Tanura	2.08
Safaniya, 27.0-27.9, Ras Tanura	1.65
Iran, 34.0-34.9, Bandar Mashur	2.04
Iran, 34.0-34.9, Abadan	1.99
Iraq, 35.0-35.9, Fao	1.98
Kuwait, 31.0-31.9, Mina-al-Ahmadi	1.85
Qatar, 41.0-41.9, Umm Said	2.23
Neutral Zone, Burghan, 23.5-24.4, Mina Saud	1.61
N. Zone, Eocene-Ratawi, 20.5-21.4, Mina Saud	1.43
Middle East, Eastern Mediterranean	
Arabian, 36.0-36.9, Sidon	2.49
Iraqi, 36.0-36.9, Tripoli, Banias	2.49
Far East, Cargoes, FOB Lutong, Sarawak	
Seria Light, 37-38	2.75

KEY TANKER RATES

(Last paid, per long ton, single voyage)

U.S. Gulf-New York, clean	(USMC flat) $2.85
U.S. Gulf-New York, dirty	**(USMC —5%) $2.71↑**
NWI-USNH, dirty	(USMC —45%) $1.48
NWI-UK/Cont., dirty	(Scale —50%) 16/3*
Persian Gulf-UK/Cont., dirty	(Scale —55%) 27/9*
Persian Gulf-USNH, dirty	(USMC —60%) $5.08

**Sterling.*

DEPT/Personals

ALBERT L. NICKERSON, president of Socony Mobil Oil Co., New York, was elected a director of the American Management Assn. for the third time on Sept 18. He has also served as vice-president in charge of AMA's marketing division, vice-president for the international management division, and chairman of the planning council of the International Management Assn., an AMA affiliate.

A. L. Nickerson

G. McGrew

GERALD McGREW has been elected vice-president of Cities Service Oil Co. (Del.), with headquarters in Bartlesville. Crude oil supply and transportation will continue under his supervision. McGrew joined Cities Service in 1940 as a valuation engineer. He has been a director since 1955.

J. S. BULLINGTON has joined Northern Natural Gas Co. as senior industrial representative in the department of marketing, economic research and development. Bullington was formerly director of the industrial development division of the Oklahoma State Department of Commerce and Industry.

WILLIAM C. MARQUIS was named manager of the product pricing department in the Chicago general office of Standard Oil Co. (Ind.), on Sept. 1. Marquis will work under the present manager of the department, **Harold K. Apel,** until he retires later this year. Marquis, with Indiana Standard since 1940, was most recently administrative manager for the company's northwestern region, at Minneapolis.

DR. OLIVER A. OHMANN, formerly assistant to the president of Standard Oil Co. (Ohio), Cleveland, has been named manager of the company's new employee relations department, a combination of the industrial relations department and the management-development and organization-planning activities. **Thomas G. Shirreffs** has been appointed Ohmann's deputy in the new department. Shirreffs was most recently assistant director of industrial relations.

MAX C. GOVIER has been named secretary-treasurer of Home Oil Co., Ltd., Calgary, in a reorganization of the company's executive branch. Govier assumes the responsibilities formerly held by **W. H. Atkinson,** treasurer, who has resigned, and by **J. Z. Hamilton,** secretary, who will retire shortly. **Ross Phillips** succeeds Govier as comptroller, while retaining his former responsibilities as Home's chief accountant. **R. W. Campbell** has been named general manager of production and pipelines. He takes over many of the duties formerly held by the retiring **B. W. Gillespie,** vice-president of exploration, and **John Scrymgeour,** who has resigned as executive vice-president.

K. W. BRILL has been elected vice-president of Continental Oil Co. Brill, formerly assistant to the vice-president, will continue to make his headquarters in New York. Prior to transferring to New York in 1957, Brill served as Conoco's central region general manager, at Oklahoma City.

CMDR. MORRISS H. KELLEY, USNR, has been named manager of tanker operations for Richfield Oil Corp., with headquarters at the company's marine terminal, Long Beach, Calif. Kelley joined Richfield in 1947 as assistant port engineer, and became port engineer for the company in 1950.

E. A. GRAHAM has been appointed assistant to the treasurer of Ohio Oil Co., in Findlay, Ohio. **C. K. Morgan,** formerly supervisor of the foreign accounting section of Ohio Oil's production accounting department, succeeds Graham as controller of Ohio Oil Co. of Guatemala, in Guatemala City. Graham joined Ohio Oil in 1955, and went to Guatemala a year later as controller of the company's foreign subsidiary there. Morgan joined the company in 1950 as a general clerk in the Houston division accounting department.

R. DEAN GRIMM was named manager of the gas supply department of Northern Natural Gas Co., Omaha, Neb. In his new position, Grimm will supervise gas purchases, purchase gas operations, gas reserves and availability, and underground storage. Grimm was formerly manager of gas reserves and availability, and underground storage.

R. D. Grimm

K. Bentz

KEITH BENTZ has been elected assistant vice-president of operations for Texas Illinois Natural Gas Pipeline Co., Chicago. He was formerly superintendent of pipelines. **D. T. Lutz** has been named to direct activities of the employee and public relations divisions of Texas Illinois and its affiliate, Natural Gas Pipeline Co. of America, from headquarters in Chicago. Lutz has been field superintendent of compressor stations for Texas Illinois at Malvern, Ark.

I. J. PIERCE has joined Reading & Bates Offshore Drilling Co. as manager of the newly created land and exploration department, in Tulsa. He was formerly division manager of the land and geological department of Phillips Petroleum Co., in Oklahoma City.

I. J. Pierce

C. H. Muncy

C. HILLYARD MUNCY has been promoted to supervisor of the newly created mobile transportation division of Anchor Petroleum Co., and to assistant to **Fred Shellhorn,** Anchor's vice-president of traffic and transportation. Muncy, in the traffic and transportation department since 1953, will divide his time between Anchor's offices in Tulsa and Shreveport.

C. M. MacINNES has been appointed secretary, and **H. W. BLISS** treasurer, of Bailey Selburn Oil & Gas, Ltd., Calgary. In addition to his new duties, MacInnes will continue in charge of Baysel's law department and administrative division. Bliss will serve as comptroller as well as treasurer. Both appointments fill vacancies created by the resignation of **S. B. Laing** as secretary-treasurer.

LEWIS H. WARE was appointed executive assistant to the management of Ashland Oil & Refining Co., Ashland, Ky. He served as the company's first employment manager, and became personnel manager in 1950.

J. G. MILLER, vice-president of the Pennzoil division of South Penn Oil Co., Oil City, Pa., has become chairman of the new Associated Petroleum Industries Committee of Pennsylvania, a consolidation of the public affairs activities of the petroleum industry in that state, with headquarters in Harrisburg. **W. D. Nelson,** division general manager, Gulf Oil Corp., Philadelphia, is vice-chairman of the new group.

ROBERT S. MOEHLMAN has been appointed chairman of the finance committee of Austral Oil Co., formerly known as Austral Oil Exploration Co., and of Austral 1959 Corp. for Oil Exploration, a new company beginning operations in 1959. Moehlman is also executive vice-president, a director, and a member of the parent company's executive committee. **C. W. Leisk** has been elected an executive vice-president and a director, and has been named a member of the executive committee of both companies. He will be re-

sponsible for the direction and administration of the geological, production, and land and legal departments of the two companies. The two men are located in Houston.

BERT M. NUNNALLEE, Midwest Oil Corp., is the new president of the Fort Worth Landmen's Assn. Four other new officers of the association are: **Harvey W. Bradshaw,** Pure Oil Co., first vice-president; **C. Taylor Pruitt,** Champlin Oil & Refining Co., second vice-president; **W. P. Duncan, Jr.,** Richardson & Bass, treasurer; and **Robert L. Trimble,** Southland Royalty Co., secretary.

P. W. McFARLAND has been promoted to exploration manager of Sun Oil Co.'s Latin America division, in Caracas. **L. C. Smith,** formerly assistant division chief geologist, succeeds McFarland as division chief geologist. Other changes at Sun's Caracas headquarters include: **L. M. Rucker,** formerly district paleontologist, now regional paleontologist; **J. A. Waller,** formerly district geophysicist, now division geophysicist; and **R. C. Weart,** formerly with Sun's physical research laboratories in Dallas, now research geologist for the Latin America division.

ERNEST O. THOMPSON, senior member of the Texas Railroad Commission, will be 1958 recipient of the John Franklin Carll Award, to be presented next week by the Society of Petroleum Engineers of AIME, at its fall meeting, in Houston. The award's purpose is "to recognize distinguished achievement in or contributions to petroleum engineering."

STEPHEN B. RODI was appointed director of employee relations for Ethyl Corp., in New York. Rodi succeeds **G. O. Hayes,** who is general manager of the manufacturing department, and who will now devote all his time to that department. Rodi was most recently an attorney at Ethyl's Baton Rouge plant.

R. O. Rhoades

D. Proctor

G. W. Wyckoff

RALPH O. RHOADES has been elected executive vice-president of Gulf Oil Corp., Pittsburgh, succeeding **DAVID PROCTOR,** who was elected chairman of the board. At the same time, **GEORGE W. WYCKOFF,** governor vice-president of T. Mellon & Sons, Pittsburgh, was elected a Gulf director. Rhoades, with Gulf since 1926, became a vice-president in 1951, and was placed in charge of the company's world-wide exploration and production activities in 1953. He has been senior vice-president since 1955, and in 1957 was elected to the board. Proctor, with Gulf for the past 39 years, was elected vice-president, general counsel, and a member of the board in 1945. He has been executive vice-president since 1954. Wyckoff also serves on the board of M. A. Hanna Co., Cleveland; Carborundum Co., Niagara Falls; and The McKay Co., Mellon National Bank & Trust Co., Consolidation Coal Co., Wyckoff Steel Co., and Aluminum Co. of America, all in Pittsburgh.

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Who Will Drill The Holes?

DRILLING CONTRACTORS HAVE GROWN steadily in importance during the past two decades or so. In 1935, for example, contractors accounted for only 68% of the footage drilled in the search for oil and gas in the U.S. Now they drill close to 95% of the total footage. And they are drilling an increasing amount of footage in producing areas overseas.

Contractors are specialists. They have reached their position of importance in the oil industry because they do a job for producers more economically than producers can do it for themselves. That is the only reason for their existence.

Over the years, contract drilling has grown because contractors have continually improved their efficiency. They've developed new techniques and have worked with manufacturers in developing better equipment. Despite such improvements, however, the outlook isn't too bright.

CONTRACTORS ARE IN TROUBLE. Some have been forced out of business; others have stacked their rigs.

A look at recent trends in drilling prices points up the problem. In 1935, the average contract price was $5 a foot. It was equal to 62.5% of the total well costs to producers.

By 1957, the total well costs to producers had jumped 75%, to average $14 a foot. But the contractors' price actually declined to an average of $4.60 a foot, only a third of total costs. And meanwhile, average depth per hole increased by 49%.

Prices paid for drilling are not commensurate with the investment made by contractors, the risks they have to take, and the technical know-how they possess.

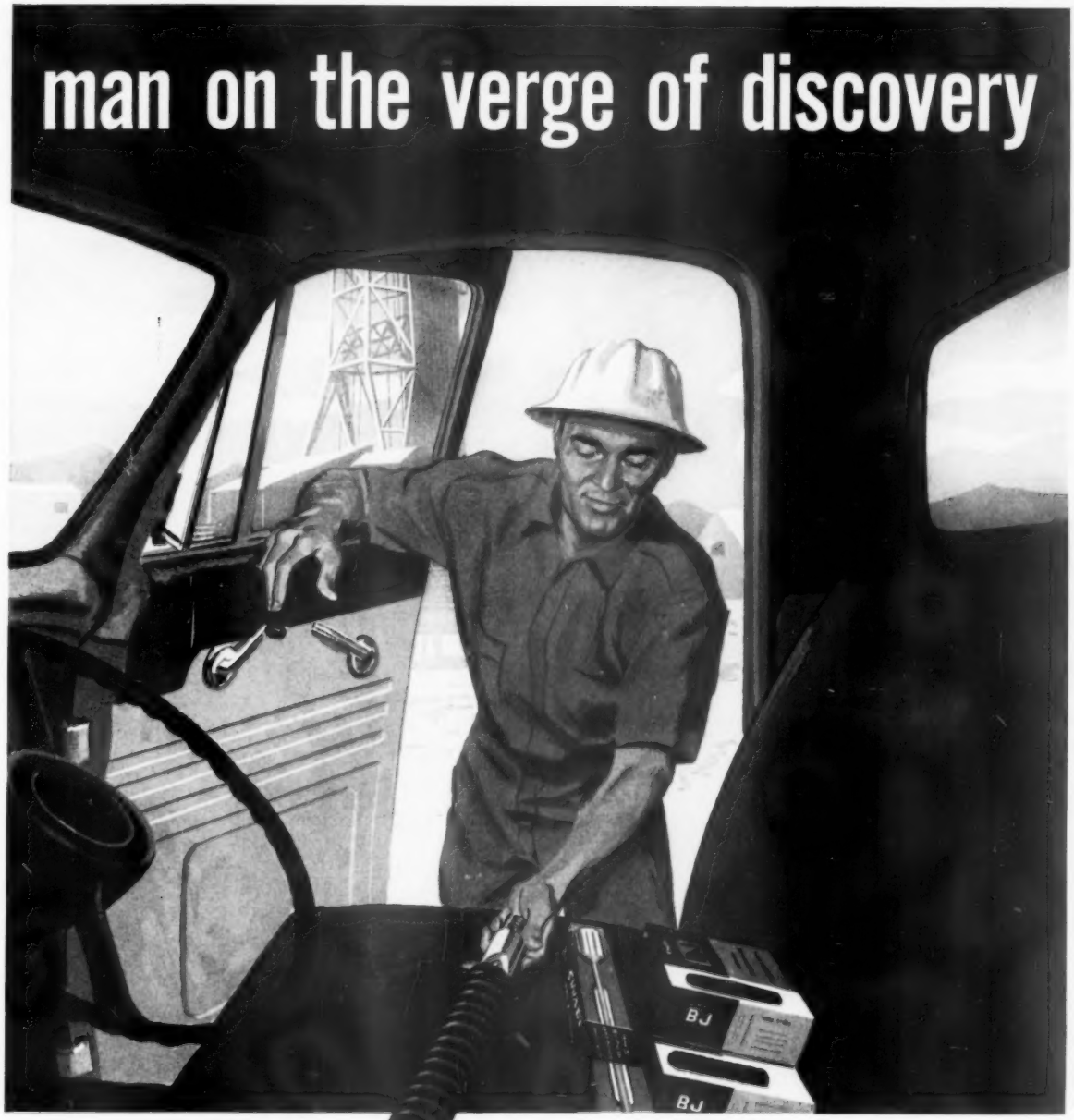
A large share of the blame for the contractors' plight rests with contractors themselves. Idle rigs have promoted unrealistically low bids by some—bids made in desperation. And, too, some producers have "shopped" for bargain prices. The results of both practices have brought the general drilling price down. Profit-margins are small or nonexistent.

If the industry is to continue to push toward the deepest potential reserves (page 34), drilling specialists are absolutely essential to the success of such efforts.

The bargains received today in contractors' prices will be questionable ones indeed if they continue to force contractors to the wall, contractors with much-needed know-how.

PRODUCER-OPERATED RIGS ARE A RARITY NOW. But unless conditions change, producers will find themselves back in the drilling business. That will mean they will have to make new capital investments in drilling equipment—funds that could be put to better use.

man on the verge of discovery



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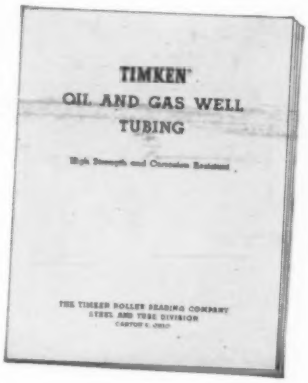

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